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Office européen des brevets



(11)

**EP 1 096 060 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
02.05.2001 Bulletin 2001/18

(51) Int Cl.7: **D06M 23/06**

(21) Application number: **99870223.7**

(22) Date of filing: **27.10.1999**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

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(54) **Wrinkle resistant composition**

(57) There is provided a composition comprising a water-soluble lubricant and components having a devi-

ation of fabric wrinkle recovery angle versus water of at least +15, whereby the combination imparts in-wear wrinkle resistance to the fabric treated therewith.

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**Description****Technical field of the invention**

5 [0001] The present invention relates to fabric care compositions and to a method for treating fabrics in order to improve various properties of fabrics, in particular in-wear wrinkle resistance.

**Background of the invention**

10 [0002] Wrinkles in textile fabrics are caused by the bending and creasing of the textile material which places an external portion of a filament in a yarn under tension while the internal portion of that filament in the yarn is placed under compression. Particularly with cotton fabrics, the hydrogen bonding that occurs between the cellulose molecules contributes to keeping wrinkles in place. The wrinkling of fabric, in particular clothing, is therefore subject to the inherent

15 [0003] In the modern world, with the increase of hustle and bustle and travel, there is a demand for a quick fix which will help to diminish the labor involved in home laundering and/or the cost and time involved in dry cleaning or commercial laundering. Further, it is well known that alternating cycles of using and laundering fabrics and textiles, such as articles of worn clothing and apparel, will inevitably adversely affect the appearance and integrity of the fabric and textile items so used and laundered. Fabrics and textiles simply wear out over time and with use. Laundering of fabrics and textiles is necessary to remove soils and stains which accumulate therein and thereon during ordinary use. However, the laundering operation itself, over many cycles, can accentuate and contribute to the deterioration of the integrity and the appearance of such fabrics and textiles. Accordingly, this has brought additional pressure to bear on textile technologists to produce a product that will sufficiently reduce wrinkles in fabrics, especially clothing, whilst still producing a good appearance through a simple, convenient application of a product.

25 [0004] The prior art contains numerous examples of compositions for reducing wrinkles. U.S. 5,532,023, discloses aqueous wrinkle control compositions containing non-volatile silicone and film forming polymer. Preferred silicones include reactive silicones and amino-functional silicone, known as "amodimethicone". The composition containing such silicones is applied to fabric from a spray dispenser. It is found that in the spray treatment, an appreciable amount of the aqueous composition misses the fabric, and instead falls on flooring surfaces, such as rugs, carpets, concrete floors, tiled floors, linoleum floors, bathtub floors, which leaves a silicone layer that is accumulated on and/or cured on and/or bonded to the flooring surfaces. Such silicones that are accumulated on such surfaces, and especially those that are bonded to such surfaces are difficult to remove. Flooring surfaces thus become slippery and can present a safety hazard to the household members. U.S. 5,573,695 discloses an aqueous wrinkle removal composition containing a vegetable oil based cationic quaternary ammonium surfactant, and an anionic fluorosurfactant. Similarly, U.S. 4,661,268 discloses a wrinkle removal spray comprising an aqueous alcoholic composition containing a dialkyl quaternary ammonium salt and a silicone surfactant and/or a fluoro surfactant. U.S. 5,100,566 discloses a method of reducing wrinkles in fabric by spraying the fabric with an aqueous alcoholic solution of an anionic silicate alkali metal salt. U.S. 4,806,254 discloses fabric wrinkle removal aqueous alcoholic solution containing glycerine and a nonionic surfactant. WO98/04772 provides the treatment of fabric against fabric creasing by application of a composition comprising a polycarboxylic acid or derivative thereof; and then curing the composition using a domestic process. Starch is also a conventional ingredient of dewrinkling compositions. However, while starch provides a suitable visual benefit onto the treated fabrics, it also gives fabric with an undesired stiff or starchy feeling. These patents are incorporated herein by reference.

45 [0005] Accordingly, the domestic treatment of fabric is a problem known in the art to the formulator of laundry compositions. Therefore, there is a need for a wrinkle reducing composition which reduces the above mentioned negatives.

[0006] Further, most of the focus in the dewrinkling area has been on providing compositions with instant dewrinkling. However, with the current trends of reducing the labor involved in ironing, it has now been found that there is a need for a composition that would additionally provide in-wear wrinkle resistance, i.e. a composition that would provide long-lasting benefit upon ironing, and wearing.

50 [0007] Moreover, there is also a need for an efficient and economical composition.

[0008] It has now surprisingly been found that the combination of a water-soluble lubricant and component having a deviation of fabric Wrinkle Recovery Angle (WRA) versus water of at least +15 fulfill such a need. This finding is particularly, especially when the component providing such deviation is a polymer. Indeed, it is known that the combination of water-soluble lubricant with polymer is often the cause of phase separation. Further, often the addition of polymer like starch on top of composition comprising water-soluble lubricant was found to give even worse results on the in-wear performance. Surprisingly, it has been found that the addition of a component providing a deviation of fabric WRA of at least +15 overcome such problems.

[0009] Accordingly, the present invention reduces wrinkles in fabrics, including clothing, dry cleanables, linens, bed

clothes, and draperies, by ironing. The present invention can be used on damp or dry clothing to relax wrinkles and give clothes a ready to wear look with lasting benefits that is demanded by today's fast paced world.

[0010] In a preferred aspect, an additional benefit of the composition of the present invention is an improved garment shape, body and crispness.

[0011] The composition of the present invention acts as an excellent ironing aid. The present invention makes the task of ironing easier and faster by creating less iron drag. The compositions of the present invention help produce a crisp, smooth appearance.

#### Summary of the invention

[0012] The present invention is a wrinkle reducing composition comprising a water-soluble lubricant and a component having a deviation of fabric Wrinkle Recovery angle (WRA) versus water of at least +15.

[0013] In another aspect of the invention, there is provided an article of manufacture comprising the composition of the invention.

[0014] Still in a further aspect of the invention, there is provided a method of treating fabrics for imparting benefits selected from the group consisting of: reducing wrinkles; imparting in-wear resistance to fabrics.

[0015] In a further aspect of the invention, there is provided an article of manufacture comprising a container and the composition of the invention in association with instructions to use.

#### Detailed description of the invention

##### 1)-Water-soluble lubricant

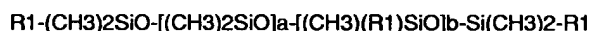
[0016] One essential component of the invention is a water-soluble lubricant. By means of this component, the composition provides an ease of ironing whilst still avoiding the staining of fabric and/or presenting safety hazard to the household members.

[0017] For the purposes of the present invention the term "water-soluble" is defined as "a component which when dissolved in water at a level of 0.2% by weight, or less, at 25° C, forms a clear, isotropic liquid".

[0018] Typical water-soluble lubricants include components selected from nonionic silicone containing surfactants, sorbitan esters, ethoxylated sorbitan esters, and mixtures thereof. The water-soluble lubricants are preferably present in an amount of from 0.1% to 70% by weight of the composition, more preferably of from 1 to 10% by weight of the composition for diluted composition and of from 20 to 50% by weight of the composition for concentrated compositions.

##### Nonionic Silicone Containing Surfactants

[0019] A preferred class of nonionic silicone containing surfactants are the polyalkylene oxide polysiloxanes having a dimethyl polysiloxane hydrophobic moiety and one or more hydrophilic polyalkylene side chains, and having the general formula:



wherein a + b are from about 1 to about 50, preferably from about 1 to about 30, more preferably from about 1 to about 25, and each R1 is the same or different and is selected from the group consisting of methyl and a poly(ethyleneoxide/propyleneoxide) copolymer group having the general formula:



with at least one R1 being a poly(ethyleneoxy/propyleneoxy) copolymer group, and wherein n is 3 or 4, preferably 3; total c (for all polyalkyleneoxy side groups) has a value of from 1 to about 100, preferably from about 6 to about 100; total d is from 0 to about 14, preferably from 0 to about 3; and more preferably d is 0; total c+d has a value of from about 5 to about 150, preferably from about 7 to about 100 and each R2 is the same or different and is selected from the group consisting of hydrogen, an alkyl having 1 to 4 carbon atoms, and an acetyl group, preferably hydrogen and methyl group. Each polyalkylene oxide polysiloxane has at least one R1 group being a poly(ethyleneoxide/propyleneoxide) copolymer group.

[0020] Nonlimiting examples of this type of surfactants are the Silwet® surfactants which are available OSI Specialties Inc., a Division of Witco, Danbury, Connecticut. Representative Silwet® surfactants which contain only ethyleneoxy

(C<sub>2</sub>H<sub>4</sub>O) groups are as follows.

Name	Average MW	Average a+b	Average total c
L-7608	600	1	8
L-7607	1,000	2	17
L-77	600	1	9
L-7605	6,000	20	99
L-7604	4,000	21	53
L-7600	4,000	11	68
L-7657	5,000	20	76
L-7602	3,000	20	29
L-7622	10,000	88	75

**[0021]** Nonlimiting examples of Silwet® surfactants which contain both ethyleneoxy (C<sub>2</sub>H<sub>4</sub>O) and propyleneoxy (C<sub>3</sub>H<sub>6</sub>O) groups are as follows.

Name	Average MW	EO/PO ratio
L-720	12,000	50/50
L-7001	20,000	40/60
L-7002	8,000	50/50
L-7210	13,000	20/80
L-7200	19,000	75/25
L-7220	17,000	20/80

**[0022]** The molecular weight of the polyalkyleneoxy group (R<sub>1</sub>) is less than or equal to about 10,000. Preferably, the molecular weight of the polyalkyleneoxy group is less than or equal to about 8,000, and most preferably ranges from about 300 to about 5,000. Thus, the values of c and d can be those numbers which provide molecular weights within these ranges. However, the number of ethyleneoxy units (-C<sub>2</sub>H<sub>4</sub>O) in the polyether chain (R<sub>1</sub>) must be sufficient to render the polyalkylene oxide polysiloxane water soluble. If propyleneoxy groups are present in the polyalkyleneoxy chain, they can be distributed randomly in the chain or exist as blocks. Mixtures of Silwet® surfactants which contain both ethyleneoxy and propyleneoxy groups, are also preferred. Preferred Silwet® surfactants are the L-7001, L-7087, L-7200, L-7280, L-7600, L-7608, L-7622, L-7657.

**[0023]** The preparation of polyalkylene oxide polysiloxanes is well known in the art. Polyalkylene oxide polysiloxanes of the present invention can be prepared according to the procedure set forth in U.S. Pat. No. 3,299,112, incorporated herein by reference. Typically, polyalkylene oxide polysiloxanes of the surfactant blend of the present invention are readily prepared by an addition reaction between a hydrosiloxane (i.e., a siloxane containing silicon-bonded hydrogen) and an alkenyl ether (e.g., a vinyl, allyl, or methallyl ether) of an alkoxy or hydroxy end-blocked polyalkylene oxide). The reaction conditions employed in addition reactions of this type are well known in the art and in general involve heating the reactants (e.g., at a temperature of from about 85° C. to 110° C.) in the presence of a platinum catalyst (e.g., chloroplatinic acid) and a solvent (e.g., toluene).

**[0024]** Still other preferred water-soluble lubricants of the nonionic type are those from the class of sorbitan esters and/or alkylethoxylate sorbitan ester. These ethoxylated sorbitan esters are formed by ethoxylation of sorbitan or its cyclic derivative sorbitan, followed by esterification of one of the available hydroxy groups to introduce one long chain alkyl or alkenyl group, leaving the remaining hydroxy groups free. Compounds of this type are included in the range commercially available under the Registered Trade Mark TWEEN from Aldrich and from ICI United States Inc, but are also available from other suppliers e.g Radasurf 7137 (Polyethoxylated (20 moles) sorbitan monolaurate), Radasurf 7147 (Polysorbate 60), Radasurf 7157 (Polysorbate 80) commercially available from FINA and Tween 65 (Polyethoxylated (20 moles) sorbitan tristearate), Tween 20 (Polyethoxylated (20 moles) sorbitan monolaurate), Tween 21 (Polyethoxylated (4 moles) sorbitan monolaurate), Tween 40 (Polyethoxylated (20 moles) sorbitan palmitate), commercially available from Aldrich.

## **2)-component having a deviation of fabric WRA versus water of at least +15**

**[0025]** A component having a deviation of fabric WRA of at least +15 is another essential component of the invention. Typically, these components are present in an amount of at least about 0.01%, preferably from about 0.1% to about

20% by weight of the composition, preferably to about 4% by weight of the diluted composition, preferably to about 12% by weight of the concentrated composition.

#### Wrinkle Recovery Angle (WRA) Test Method:

[0026] The WRA Test method is taken from the AATCC 66-1990. This method is an American National Standard method designed for the determination of the wrinkle recovery of woven fabrics, whereby a test specimen, creased and compressed under controlled conditions of time and load, is suspended in the test instrument for a controlled recovery period, after which the recovery angle is measured. Experimental detail on how to measure this WRA is given in AATCC 66-1990, incorporated herein by reference. The WRA method is tested on 100% cotton, woven Oxford pinpoint fabric, free from wrinkles, cut in twelve specimens of 0.59 inch x 1.57 inch, six with their long dimension parallel to the warp, and six with their long dimensional parallel to the filling. The test is carried out on cloth conditioned for 24 hours at 21°C (70°F) and 65% RH. Three specimens from each set are creased on one side and three on the other. Tweezers are used to place the test specimen between the leaves of the specimen holder (2 superimposed leaves 0.63 inch wide, but of different lengths and fastened together at one end) with one end directly under the 0.71-inch mark. With the tweezers, the exposed end of the specimen is lifted over and looped back to the 0.71-inch mark on the shorter, thin metal leaf and holded with the left thumbnail. The holder with the specimen is inserted into a plastic press (2 superimposed leaves of equal length (3.74 inch) and 0.79 inch wide, fastened together at one end) and a weight of 500g is applied for 5 minutes so that a crease is formed. The plastic press can then be removed and the specimen holder combination can be inserted in the tester with the exposed end of the specimen holder in the mount on the face of the tester. The crease should line up with a spot at the centre of the tester disk, and the dangling specimen leg should be lined up immediately with the vertical guide line. In order to eliminate gravitation effects, keep the dangling specimen leg aligned with the vertical guide line during the 5-min recovery period. Adjust every 15 seconds for the first minute, and once a minute thereafter. Five minutes after the removal of the creasing load, the wrinkle recovery value is read to the nearest degree from the scale. The sum is taken of the average recovery for all warp readings and all filling readings and compared with a cloth treated with water.

[0027] Components defined by their WRA are well known in the art. For example, in JAPS, Vol.15, pp.341-349 (1971) as well as in Textile Research Journal, pp. 199-201, Feb.1970, are given various examples of components defined by a WRA, all of which are included within the scope of the present invention.

[0028] The fabric WRA obtained with the tested component is compared with the fabric WRA obtained with water, thereby giving a deviation  $\Delta$ . A component which provide a  $\Delta$  of at least positive(+), preferably having a  $\Delta$  within the range of 15-30 is a component suitable for the invention.

[0029] The following represents the WRA deviation versus water of different polymers suitable for use in the present invention and according to the above procedure. In each case, numbers are arithmetic averages of 9 replicates and the results are statistically significantly different at 95% confidence level:

Polymer	$\Delta$ WRA
IMO 900	19
Avalure AC 120	21
Luviqat FC 905	15

- IMO 900: Isomaltose Oligosaccharide ex. Showa Sangyo Co.
- Avalure AC 120 :Polyacrylate ex. BF Goodrich
- Luviqat FC 905 :copolymer Vinylimidazolium methochloride & Vinylpyrrolidone ex. BASF

[0030] Preferred components which have a deviation of fabric WRA versus water of at least 15 are selected from shape retention polymers, polymers comprising at least one unit which provide a dye transfer inhibiting benefit, polyurethanes, polyamine polymers, Isomaltooligosaccharide, and mixtures thereof. Most preferred are the polymers which are water-soluble.

#### **1)-Shape Retention Polymer**

[0031] These polymers can be natural, or synthetic, and can act by forming a film, and/or by providing adhesive properties. E.g., the present invention can optionally use film-forming and/or adhesive polymer to impart shape retention to fabric, particularly clothing. By "adhesive" it is meant that when applied as a solution or a dispersion to a fiber surface and dried, the polymer can attach to the surface. The polymer can form a film on the surface, or when residing between

two fibers and in contact with the two fibers, it can bind the two fibers together. Other polymers such as Isomaltose Oligosaccharide can form a film and/or bond the fibers together when the treated fabric is pressed by a hot iron. Such a film will have adhesive strength, cohesive breaking strength, and cohesive breaking strain.

[0032] Nonlimiting examples for natural polymers are Isomaltose *Oligosaccharide* and their derivatives, and chitins and their derivatives.

[0033] The synthetic polymers useful in the present invention are comprised of monomers. Some nonlimiting examples of monomers which can be used to form the synthetic polymers of the present invention include: low molecular weight  $C_1$ - $C_6$  unsaturated organic mono-carboxylic and polycarboxylic acids, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and mixtures thereof; esters of said acids with  $C_1$ - $C_{12}$  alcohols, such as methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-methyl-1-propanol, 1-pentanol, 2-pentanol, 3-pentanol, 2-methyl-1-butanol, 1-methyl-1-butanol, 3-methyl-1-butanol, 1-methyl-1-pentanol, 2-methyl-1-pentanol, 3-methyl-1-pentanol, t-butanol, cyclohexanol, 2-ethyl-1-butanol, neodecanol, 3-heptanol, benzyl alcohol, 2-octanol, 6-methyl-1-heptanol, 2-ethyl-1-hexanol, 3,5-dimethyl-1-hexanol, 3,5,5-trimethyl-1-hexanol, 1-decanol, 1-dodecanol, and the like, and mixtures thereof. Nonlimiting examples of said esters are methyl acrylate, ethyl acrylate, t-butyl acrylate, methyl methacrylate, hydroxyethyl methacrylate, methoxy ethyl methacrylate, and mixtures thereof; amides and imides of said acids, such as N,N-dimethylacrylamide, N-t-butyl acrylamide, maleimides; low molecular weight unsaturated alcohols such as vinyl alcohol (produced by the hydrolysis of vinyl acetate after polymerization), allyl alcohol; esters of said alcohols with low molecular weight carboxylic acids, such as, vinyl acetate, vinyl propionate; ethers of said alcohols such as methyl vinyl ether; aromatic vinyl such as styrene, alpha-methylstyrene, t-butylstyrene, vinyl toluene, polystyrene macromer, and the like; polar vinyl heterocyclics, such as vinyl pyrrolidone, vinyl caprolactam, vinyl pyridine, vinyl imidazole, and mixtures thereof; other unsaturated amines and amides, such as vinyl amine, diethylene triamine, dimethylaminoethyl methacrylate, ethenyl formamide; vinyl sulfonate; salts of acids and amines listed above; low molecular weight unsaturated hydrocarbons and derivatives such as ethylene, propylene, butadiene, cyclohexadiene, vinyl chloride; vinylidene chloride; and mixtures thereof and alkyl quaternized derivatives thereof, and mixtures thereof.

[0034] Preferably, said monomers are selected from the group consisting of vinyl alcohol; acrylic acid; methacrylic acid; methyl acrylate; ethyl acrylate; methyl methacrylate; t-butyl acrylate; t-butyl methacrylate; n-butyl acrylate; n-butyl methacrylate; isobutyl methacrylate; 2-ethylhexyl methacrylate; dimethylaminoethyl methacrylate; N,N-dimethyl acrylamide; N,N-dimethyl methacrylamide; N-t-butyl acrylamide; vinylpyrrolidone; vinyl pyridine; adipic acid; diethylenetriamine; salts thereof and alkyl quaternized derivatives thereof, and mixtures thereof.

[0035] Preferably, said monomers form homopolymers and/or copolymers (i.e., the film-forming and/or adhesive polymer) having a glass transition temperature (Tg) of from about -20°C to about 150°C, preferably from about -10°C to about 150°C, more preferably from about 0°C to about 100°C, most preferably, the adhesive polymer hereof, when dried to form a film will have a Tg of at least about 25°C., so that they are not unduly sticky, or "tacky" to the touch. Preferably said polymer is soluble and/or dispersible in water and/or alcohol. Said polymer typically has a molecular weight of at least about 500, preferably from about 1,000 to about 2,000,000, more preferably from about 5,000 to about 1,000,000, and even more preferably from about 30,000 to about 300,000 for some polymers.

[0036] Some non-limiting examples of homopolymers and copolymers which can be used as film-forming and/or adhesive polymers of the present invention are: adipic acid/dimethylaminohydroxypropyl diethylenetriamine copolymer; adipic acid/epoxypropyl diethylenetriamine copolymer; poly(vinylpyrrolidone/dimethylaminoethyl methacrylate); polyvinyl alcohol; polyvinylpyridine n-oxide; methacryloyl ethyl betaine/methacrylates copolymer; ethyl acrylate/methyl methacrylate/methacrylic acid/acrylic acid copolymer; polyamine resins; and polyquaternary amine resins; poly(ethenylformamide); poly(vinylamine) hydrochloride; poly(vinyl alcohol-co-6% vinylamine); poly(vinyl alcohol-co-12% vinylamine); poly(vinyl alcohol-co-6% vinylamine hydrochloride); and poly(vinyl alcohol-co-12% vinylamine hydrochloride). Preferably, said copolymer and/or homopolymers are selected from the group consisting of adipic acid/dimethylaminohydroxypropyl diethylenetriamine copolymer; poly(vinylpyrrolidone/dimethylaminoethyl methacrylate); polyvinyl alcohol; ethyl acrylate/methyl methacrylate/methacrylic acid/acrylic acid copolymer; methacryloyl ethyl betaine/methacrylates copolymer; polyquaternary amine resins; poly(ethenylformamide); poly(vinylamine) hydrochloride; poly(vinyl alcohol-co-6% vinylamine); poly(vinyl alcohol-co-12% vinylamine); poly(vinyl alcohol-co-6% vinylamine hydrochloride); and poly(vinyl alcohol-co-12% vinylamine hydrochloride).

[0037] Preferred polymers useful in the present invention are selected from the group consisting of copolymers of hydrophilic monomers and hydrophobic monomers. The polymer can be linear random or block copolymers, and mixtures thereof. Such hydrophobic/hydrophilic copolymers typically have a hydrophobic monomer/hydrophilic monomer ratio of from about 95:5 to about 20:80, preferably from about 90:10 to about 40:60, more preferably from about 80:20 to about 50:50 by weight of the copolymer. The hydrophobic monomer can comprise a single hydrophobic monomer or a mixture of hydrophobic monomers, and the hydrophilic monomer can comprise a single hydrophilic monomer or a mixture of hydrophilic monomers. The term "hydrophobic" is used herein consistent with its standard meaning of lacking affinity for water, whereas "hydrophilic" is used herein consistent with its standard meaning of having affinity

for water. As used herein in relation to monomer units and polymeric materials, including the copolymers, "hydrophobic" means substantially water insoluble; "hydrophilic" means substantially water soluble. In this regard, "substantially water insoluble" shall refer to a material that is not soluble in distilled (or equivalent) water, at 25°C., at a concentration of about 0.2% by weight, and preferably not soluble at about 0.1% by weight (calculated on a water plus monomer or polymer weight basis). "Substantially water soluble" shall refer to a material that is soluble in distilled (or equivalent) water, at 25°C., at a concentration of about 0.2% by weight, and are preferably soluble at about 1% by weight. The terms "soluble", "solubility" and the like, for purposes hereof, corresponds to the maximum concentration of monomer or polymer, as applicable, that can dissolve in water or other solvents to form a homogeneous solution, as is well understood to those skilled in the art.

**[0038]** Nonlimiting examples of useful hydrophobic monomers are acrylic acid C<sub>1</sub>-C<sub>18</sub> alkyl esters, such as methyl acrylate, ethyl acrylate, t-butyl acrylate; methacrylic C<sub>1</sub>-C<sub>18</sub> alkyl esters, such as methyl methacrylate, 2-ethyl hexyl methacrylate, methoxy ethyl methacrylate; vinyl alcohol esters of carboxylic acids, such as, vinyl acetate, vinyl propionate, vinyl neodecanoate; aromatic vinyls, such as styrene, t-butyl styrene, vinyl toluene; vinyl ethers, such as methyl vinyl ether; vinyl chloride; vinylidene chloride; ethylene, propylene and other unsaturated hydrocarbons; and the like; and mixtures thereof. Some preferred hydrophobic monomers are methyl acrylate, methyl methacrylate, t-butyl acrylate, t-butyl methacrylate, n-butyl acrylate, n-butyl methacrylate, and mixtures thereof.

**[0039]** Nonlimiting examples of useful hydrophilic monomers are unsaturated organic mono-carboxylic and polycarboxylic acids, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid; unsaturated alcohols, such as vinyl alcohol, allyl alcohol; polar vinyl heterocyclics, such as vinyl pyrrolidone, vinyl caprolactam, vinyl pyridine, vinyl imidazole; vinyl amine; vinyl sulfonate; unsaturated amides, such as acrylamides, e.g., N, N-dimethylacrylamide, N-t-butyl acrylamide; hydroxyethyl methacrylate; dimethylaminoethyl methacrylate; salts of acids and amines listed above; and the like; and mixtures thereof. Some preferred hydrophilic monomers are acrylic acid, methacrylic acid, N,N-dimethyl acrylamide, N,N-dimethyl methacrylamide, N-t-butyl acrylamide, dimethylamino ethyl methacrylate, vinyl pyrrolidone, salts thereof and alkyl quaternized derivatives thereof, and mixtures thereof.

**[0040]** Preferably, the shape retention copolymers contain hydrophobic monomers and hydrophilic monomers which comprise unsaturated organic mono-carboxylic and polycarboxylic acid monomers, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and salts thereof, and mixtures thereof; and optionally other hydrophilic monomers. These preferred polymers of the current invention surprisingly provide control of certain amine type malodors in fabrics, in addition to providing the fabric wrinkle control benefit. Examples of the hydrophilic unsaturated organic mono-carboxylic and polycarboxylic acid monomers are acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and mixtures thereof. Nonlimiting examples of the hydrophobic monomers are esters of the unsaturated organic mono-carboxylic and polycarboxylic acids cited hereinabove with C<sub>1</sub>-C<sub>12</sub> alcohols, such as methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-methyl-1-propanol, 1-pentanol, 2-pentanol, 3-pentanol, 2-methyl-1-butanol, 1-methyl-1-butanol, 3-methyl-1-butanol, 1-methyl-1-pentanol, 2-methyl-1-pentanol, 3-methyl-1-pentanol, t-butanol, cyclohexanol, 2-ethyl-1-butanol, and mixtures thereof, preferably methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-methyl-1-propanol, t-butanol, and mixtures thereof.

**[0041]** Compositions containing these polymers also can additionally comprise perfume, antibacterial active, odor control agent, static control agent, and mixtures thereof.

**[0042]** It is not intended to exclude the use of higher or lower levels of the polymers, as long as an effective amount is used to provide adhesive and film-forming properties to the composition and the composition can be formulated and effectively applied for its intended purpose.

**[0043]** Highly preferred adhesive and/or film forming polymers that are useful in the composition of the present invention actually contain silicone moieties in the polymers themselves. These preferred polymers include graft and block copolymers of silicone with moieties containing hydrophilic and/or hydrophobic monomers described hereinbefore. The silicone-containing copolymers in the composition of the present invention provide shape retention, body, and/or good, soft fabric feel.

**[0044]** Both silicone-containing graft and block copolymers useful in the present invention have the following properties:

- (1) the silicone portion is covalently attached to the non-silicone portion;
- (2) the molecular weight of the silicone portion is from about 1,000 to about 50,000; and
- (3) the non-silicone portion must render the entire copolymer soluble or dispersible in the wrinkle control composition vehicle and permit the copolymer to deposit on/adhere to the treated fabrics.

**[0045]** Suitable silicone copolymers include the following:

**(a) Silicone Graft Copolymers**

[0046] Preferred silicone-containing polymers are the silicone graft copolymers comprising acrylate groups described, along with methods of making them, in U.S. Patent No. 5,658,557, Bolich et al., issued Aug. 19, 1997, U.S. Patent No. 4,693,935, Mazurek, issued Sept. 15, 1987, and U.S. Patent No. 4,728,571, Clemens et al., issued Mar. 1, 1988. Additional silicone-containing polymers are disclosed in U.S. Pat. Nos. 5,480,634, Hayama et al., issued Oct. 2, 1996, 5,166,276, Hayama et al., issued Nov. 24, 1992, 5,061,481, issued Oct. 29, 1991, Suzuki et al., 5,106,609, Bolich et al., issued Apr. 21, 1992, 5,100,658, Bolich et al., issued Mar. 31, 1992, 5,100,657, Ansher-Jackson, et al., issued Mar. 31, 1992, 5,104,646, Bolich et al., issued Apr. 14, 1992, all of which are incorporated herein by reference.

[0047] These polymers preferably include copolymers having a vinyl polymeric backbone having grafted onto it monovalent siloxane polymeric moieties, and components consisting of non-silicone hydrophilic and hydrophobic monomers.

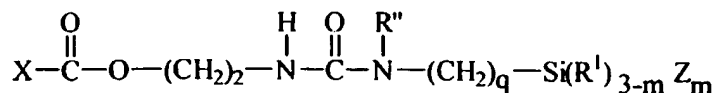
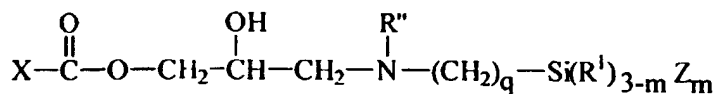
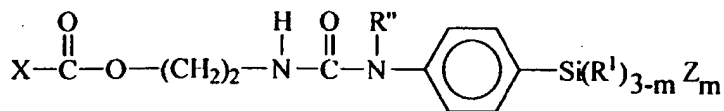
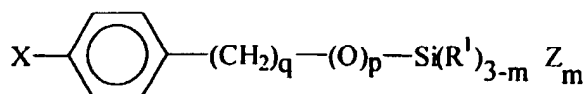
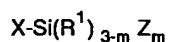
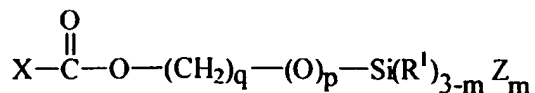
[0048] The silicone-containing monomers are exemplified by the general formula:



wherein X is a polymerizable group, such as a vinyl group, which is part of the backbone of the polymer; Y is a divalent linking group; R is a hydrogen, hydroxyl, lower alkyl (e.g. C<sub>1</sub>-C<sub>4</sub>), aryl, alkaryl, alkoxy, or alkylamino; Z is a monovalent polymeric siloxane moiety having an average molecular weight of at least about 500, is essentially unreactive under copolymerization conditions, and is pendant from the vinyl polymeric backbone described above; n is 0 or 1; and m is an integer from 1 to 3.

[0049] The preferred silicone-containing monomer has a weight average molecular weight of from about 1,000 to about 50,000, preferably from about 3,000 to about 40,000, most preferably from about 5,000 to about 20,000.

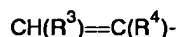
[0050] Nonlimiting examples of preferred silicone-containing monomers have the following formulas:



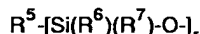
[0051] In these structures m is an integer from 1 to 3, preferably 1; p is 0 or 1; q is an integer from 2 to 6; n is an integer from 0 to 4, preferably 0 or 1, more preferably 0; R<sup>1</sup> is hydrogen, lower alkyl, alkoxy, hydroxyl, aryl, alkylamino,



preferably R<sup>1</sup> is alkyl; R<sup>n</sup> is alkyl or hydrogen; X is



R<sup>3</sup> is hydrogen or -COOH, preferably hydrogen; R<sup>4</sup> is hydrogen, methyl or -CH<sub>2</sub>COOH, preferably methyl; Z is



wherein R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup>, independently are lower alkyl, alkoxy, alkylamino, hydrogen or hydroxyl, preferably alkyl; and r is an integer of from about 5 to about 700, preferably from about 60 to about 400, more preferably from about 100 to about 300. Most preferably, R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup> are methyl, p = 0, and q = 3.

[0052] Silicone-containing adhesive and/or film-forming copolymers useful in the present invention comprise from 0% to about 90%, preferably from about 10% to about 80%, more preferably from about 40% to about 75% of hydrophobic monomer, from about 0% to about 90%, preferably from about 5% to about 80% of hydrophilic monomer, and from about 5% to about 50%, preferably from about 10% to about 40%, more preferably from about 15% to about 25% of silicone-containing monomer.

[0053] The composition of any particular copolymer will help determine its formulation properties. In fact, by appropriate selection and combination of particular hydrophobic, hydrophilic and silicone-containing components, the copolymer can be optimized for inclusion in specific vehicles. For example, polymers which are soluble in an aqueous formulation preferably contain from 0% to about 70%, preferably from about 5% to about 70% of hydrophobic monomer, and from about 30% to about 98%, preferably from about 30% to about 80%, of hydrophilic monomer, and from about 1% to about 40% of silicone-containing monomer. Polymers which are dispersible preferably contain from 0% to about 70%, more preferably from about 5% to about 70%, of hydrophobic monomer, and from about 20% to about 80%, more preferably from about 20% to about 60%, of hydrophilic monomer, and from about 1% to about 40% of silicone-containing monomer.

[0054] The silicone-containing copolymers preferably have a weight average molecular weight of from about 10,000 to about 1,000,000, preferably from about 30,000 to about 300,000.

[0055] The preferred polymers comprise a vinyl polymeric backbone, preferably having a T<sub>g</sub> or a T<sub>m</sub> as defined above of about -20°C. and, grafted to the backbone, a polydimethylsiloxane macromer having a weight average molecular weight of from about 1,000 to about 50,000, preferably from about 5,000 to about 40,000, most preferably from about 7,000 to about 20,000. The polymer is such that when it is formulated into the finished composition, and then dried, the polymer phase separates into a discontinuous phase which includes the polydimethylsiloxane macromer and a continuous phase which includes the backbone. Exemplary silicone grafted polymers for use in the present invention include the following, where the composition of the copolymer is given with the approximate weight percentage of each monomer used in the polymerization reaction to prepare the copolymer: N,N-dimethylacrylamide/isobutyl methacrylate/(PDMS macromer - 20,000 approximate molecular weight) (20/60/20 w/w/w), copolymer of average molecular weight of about 400,000; N,N-dimethylacrylamide/(PDMS macromer - 20,000 approximate molecular weight) (80/20 w/w), copolymer of average molecular weight of about 300,000; and t-butylacrylate/N,N-dimethylacrylamide/(PDMS macromer - 10,000 approximate molecular weight) (70/10/20), copolymer of average molecular weight of about 400,000.

[0056] Highly preferred shape retention copolymers of this type contain hydrophobic monomers, silicone-containing monomers and hydrophilic monomers which comprise unsaturated organic mono- and polycarboxylic acid monomers, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and salts thereof, and mixtures thereof. These preferred polymers surprisingly provide control of certain amine type malodors in fabrics, in addition to providing the fabric wrinkle control benefit. A nonlimiting example of such copolymer is n-butylmethacrylate/acrylic acid/(polydimethylsiloxane macromer, 20,000 approximate molecular weight) copolymer of average molecular weight of about 100,000, and with an approximate monomer weight ratio of about 70/10/20. A highly preferred copolymer is composed of acrylic acid, t-butyl acrylate and silicone-containing monomeric units, preferably with from about 20% to about 90%, preferably from about 30% to about 80%, more preferably from about 50% to about 75% t-butyl acrylate; from about 5% to about 60%, preferably from about 8% to about 45%, more preferably from about 10% to about 30% of acrylic acid; and from about 5% to about 50%, preferably from about 10% to about 40%, more preferably from about 15% to about 30% of polydimethylsiloxane of an average molecular weight of from about 1,000 to about 50,000, preferably from about 5,000 to about 40,000, most preferably from about 7,000 to about 20,000. Nonlimiting examples of acrylic acid/tert-butyl acrylate/polydimethyl siloxane macromer copolymers useful in the present invention, with approximate monomer weight ratio, are: t-butylacrylate/acrylic acid/(polydimethylsiloxane macromer, 10,000 approximate molecular weight) (70/10/20 w/w/w), copolymer of average molecular weight of about 300,000; t-butyl ac-

10 **[0057]** Also useful herein are silicone block copolymers comprising repeating block units of polysiloxanes.  
**[0058]** Examples of silicone-containing block copolymers are found in U.S. Patent No. 5,523,365, to Geck et al.,  
issued June 4, 1996; U.S. Patent No. 4,689,289, to Crivello, issued Aug. 25, 1987; U.S. Patent No. 4,584,356, to  
Crivello, issued April 22, 1986; *Macromolecular Design, Concept & Practice*, Ed: M. K. Mishra, Polymer Frontiers  
International, Inc., Hopewell Jct., NY (1994), and *Block Copolymers*, A. Noshay and J. E. McGrath, Academic Press,  
15 NY (1977), which are all incorporated by reference herein in their entirety. Other silicone block copolymers suitable for  
use herein are those described, along with methods of making them, in the above referenced and incorporated U.S.  
Patent No. 5,658,577.

**[0059]** The silicone-containing block copolymers useful in the present invention can be described by the formulas A-B, A-B-A, and  $-(A-B)_n-$  wherein n is an integer of 2 or greater. A-B represents a diblock structure, A-B-A represents a triblock structure, and  $-(A-B)_n-$  represents a multiblock structure. The block copolymers can comprise mixtures of diblocks, triblocks, and higher multiblock combinations as well as small amounts of homopolymers.

[0060] The silicone block portion, B, can be represented by the following polymeric structure

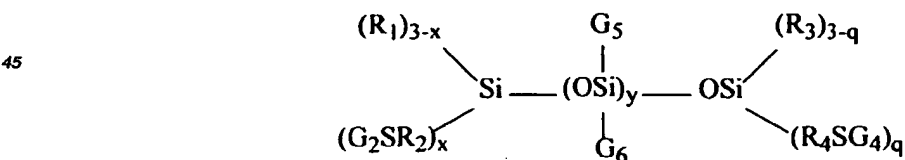


wherein each R is independently selected from the group consisting of hydrogen, hydroxyl, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>2</sub>-C<sub>6</sub> alkylamino, styryl, phenyl, C<sub>1</sub>-C<sub>6</sub> alkyl or alkoxy-substituted phenyl, preferably methyl; and m is an integer of about 10 or greater, preferably of about 40 or greater, more preferably of about 60 or greater, and most preferably of about 100 or greater.

**[0061]** The non-silicone block, A, comprises monomers selected from the monomers as described hereinabove in reference to the non-silicone hydrophilic and hydrophobic monomers for the silicone grafted copolymers. Vinyl blocks are preferred co-monomers. The block copolymers preferably contain one or more non-silicone blocks, and up to about 50%, preferably from about 10% to about 20%, by weight of one or more polydimethyl siloxane blocks.

**[0062]** Also useful herein are sulfur-linked silicone containing copolymers, including block copolymers. As used herein in reference to silicone containing copolymers, the term "sulfur-linked" means that the copolymer contains a sulfur linkage (i.e., -S-), a disulfide linkage (i.e., -S-S-), or a sulfhydryl group (i.e., -SH).

**[0063]** These sulfur-linked silicone-containing copolymers are represented by the following general formula:



50 wherein

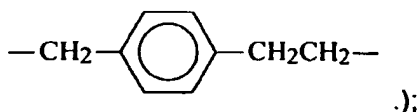
each G<sub>5</sub> and G<sub>6</sub> is independently selected from the group consisting of alkyl, aryl, alkaryl, alkoxy, alkylamino, fluoroalkyl, hydrogen, and -ZSA, wherein A represents a vinyl polymeric segment consisting essentially of polymerized free radically polymerizable monomer, and Z is a divalent linking group (Useful divalent linking groups Z include but are not limited to the following: C<sub>1</sub> to C<sub>10</sub> alkylene, alkarylene, arylene, and alkoxyalkylene. Preferably, Z is selected from the group consisting of methylene and propylene for reasons of commercial availability.); each G<sub>2</sub> comprises A;

each  $G_4$  comprises A;

each  $R_1$  is a monovalent moiety selected from the group consisting of alkyl, aryl, alkaryl, alkoxy, alkylamino, fluoroalkyl, hydrogen, and hydroxyl (Preferably,  $R_1$  represents monovalent moieties which can independently be the same or different selected from the group consisting of  $C_{1-4}$  alkyl and hydroxyl for reasons of commercial availability.

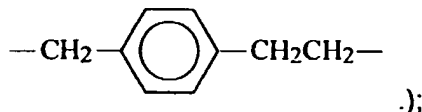
Most preferably,  $R_1$  is methyl.);

each  $R_2$  is a divalent linking group (Suitable divalent linking groups include but are not limited to the following:  $C_1$  to  $C_{10}$  alkylene, arylene, alkarylene, and alkoxyalkylene. Preferably,  $R_2$  is selected from the group consisting of  $C_{1-3}$  alkylene and  $C_7-C_{10}$  alkarylene due to ease of synthesis of the compound. Most preferably,  $R_2$  is selected from the group consisting of  $-CH_2-$ , 1,3-propylene, and



each  $R_3$  represents monovalent moieties which can independently be the same or different and are selected from the group consisting of alkyl, aryl, alkaryl, alkoxy, alkylamino, fluoroalkyl, hydrogen, and hydroxyl (Preferably,  $R_3$  represents monovalent moieties which can independently be the same or different selected from the group consisting of  $C_{1-4}$  alkyl and hydroxyl for reasons of commercial availability. Most preferably,  $R_3$  is methyl.);

each  $R_4$  is a divalent linking group (Suitable divalent linking groups include but are not limited to the following:  $C_1$  to  $C_{10}$  alkylene, arylene, alkarylene, and alkoxyalkylene. Preferably,  $R_4$  is selected from the group consisting of  $C_{1-3}$  alkylene and  $C_7-C_{10}$  alkarylene for ease of synthesis. Most preferably,  $R_4$  is selected from the group consisting of  $-CH_2-$ , 1,3-propylene, and



x is an integer of 0-3;

y is an integer of 5 or greater (preferably y is an integer ranging from about 14 to about 700, preferably from about 20 to about 200); and

q is an integer of 0-3;

wherein at least one of the following is true:

q is an integer of at least 1;

x is an integer of at least 1;

$G_5$  comprises at least one -ZSA moiety; or

$G_6$  comprises at least one -ZSA moiety.

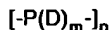
**[0064]** As noted above, A is a vinyl polymeric segment formed from polymerized free radically polymerizable monomers. The selection of A is typically based upon the intended uses of the composition, and the properties the copolymer must possess in order to accomplish its intended purpose. If A comprises a block in the case of block copolymers, a polymer having AB and/or ABA architecture will be obtained depending upon whether a mercapto functional group -SH is attached to one or both terminal silicon atoms of the mercapto functional silicone compounds, respectively. The weight ratio of vinyl polymer block or segment, to silicone segment of the copolymer can vary. The preferred copolymers are those wherein the weight ratio of vinyl polymer segment to silicone segment ranges from about 98:2 to 50:50, in order that the copolymer possesses properties inherent to each of the different polymeric segments while retaining the overall polymer's solubility.

**[0065]** Sulfur linked silicone copolymers are described in more detail in U.S. Patent No. 5,468,477, to Kumar et al., issued November 21, 1995, and PCT Application No. WO 95/03776, assigned to 3M, published February 9, 1995, which are incorporated by reference herein in their entirety.

## 2)-Polymers comprising at least one unit which provide a dye transfer inhibiting benefit

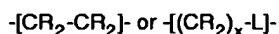
[0066] The preferred polymers comprising at least one unit which provide a dye transfer inhibiting benefit are water-soluble polymers.

[0067] The polymers comprising at least one unit which provide a dye transfer inhibiting benefit useful in the present invention have the formula:



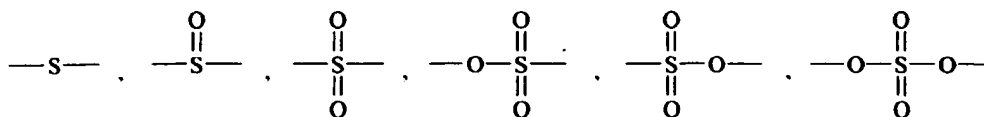
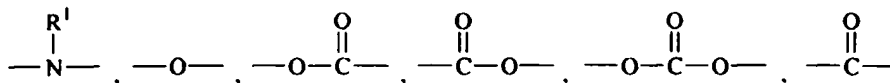
wherein the unit P is a polymer backbone which comprises units which are homopolymeric or copolymeric. D units are defined herein below. For the purposes of the present invention the term "homopolymeric" is defined as "a polymer backbone which is comprised of units having the same unit composition, i.e., formed from polymerization of the same monomer". For the purposes of the present invention the term "copolymeric" is defined as "a polymer backbone which is comprised of units having a different unit composition, i.e., formed from the polymerization of two or more monomers".

[0068] P backbones preferably comprise units having the formula:

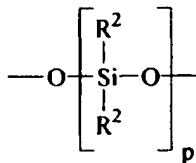


wherein each R unit is independently hydrogen, C<sub>1</sub>-C<sub>12</sub> alkyl, C<sub>6</sub>-C<sub>12</sub> aryl, and D units as described herein below; preferably C<sub>1</sub>-C<sub>4</sub> alkyl.

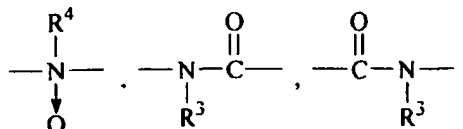
[0069] Each L unit is independently selected from heteroatom-containing moieties, non-limiting examples of which are selected from the group consisting of:



polysiloxane having the formula:



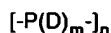
wherein the index p is from 1 to about 6; units which have dye transfer inhibition activity:



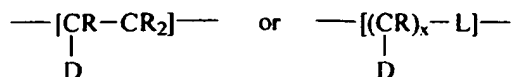
and mixtures thereof; wherein R<sup>1</sup> is hydrogen, C<sub>1</sub>-C<sub>12</sub> alkyl, C<sub>6</sub>-C<sub>12</sub> aryl, and mixtures thereof. R<sup>2</sup> is C<sub>1</sub>-C<sub>12</sub> alkyl, C<sub>1</sub>-C<sub>12</sub> alkoxy, C<sub>6</sub>-C<sub>12</sub> aryloxy, and mixtures thereof; preferably methyl and methoxy. R<sup>3</sup> is hydrogen C<sub>1</sub>-C<sub>12</sub> alkyl, C<sub>6</sub>-C<sub>12</sub>

aryl, and mixtures thereof; preferably hydrogen or C<sub>1</sub>-C<sub>4</sub> alkyl, more preferably hydrogen. R<sup>4</sup> is C<sub>1</sub>-C<sub>12</sub> alkyl, C<sub>6</sub>-C<sub>12</sub> aryl, and mixtures thereof.

**[0070]** The backbones of the polymers of the present invention comprise one or more D units which are units which comprise one or more units which provide a dye transfer inhibiting benefit. The D unit can be part of the backbone itself as represented in the general formula:



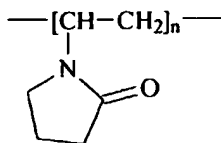
or the D unit may be incorporated into the backbone as a pendant group to a backbone unit having, for example, the formula:



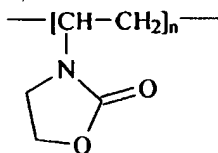
**[0071]** However, the number of D units depends upon the formulation. For example, the number of D units will be adjusted to provide water solubility of the polymer as well as efficacy of dye transfer inhibition. The molecular weight of the polymers of the present invention are from about 500, preferably from about 1,000, more preferably from about 10,000 most preferably from 200,000 to about 6,000,000, preferably to about 2,000,000, more preferably to about 1,000,000, yet more preferably to about 500,000, most preferably to about 360,000 daltons. Therefore the value of the index n is selected to provide the indicated molecular weight, and providing for a water solubility of at least 100 ppm, preferably at least about 300 ppm, and more preferably at least about 1,000 ppm in water at ambient temperature which is defined herein as 25°C.

### Polymers Comprising Amide Units

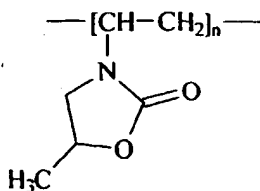
**[0072]** Non-limiting examples of preferred D units are D units which comprise an amide moiety. Examples of polymers wherein an amide unit is introduced into the polymer via a pendant group includes polyvinylpyrrolidone having the formula:



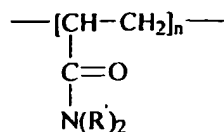
polyvinylloxazolidone having the formula:



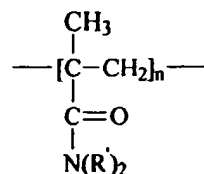
polyvinylmethyloxazolidone having the formula:



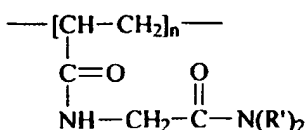
polyacrylamides and N-substituted polyacrylamides having the formula:



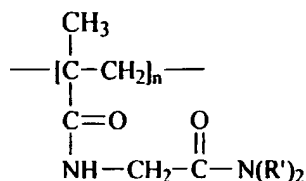
wherein each R' is independently hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, or both R' units can be taken together to form a ring comprising 4-6 carbon atoms; polymethacrylamides and N-substituted polymethacrylamides having the general formula:



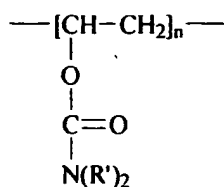
wherein each R' is independently hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, or both R' units can be taken together to form a ring comprising 4-6 carbon atoms; poly(N-acrylylglycinamide) having the formula:



wherein each R' is independently hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, or both R' units can be taken together to form a ring comprising 4-6 carbon atoms; poly(N-methacrylylglycinamide) having the formula:

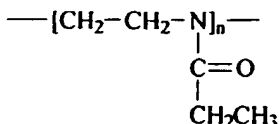


wherein each R' is independently hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, or both R' units can be taken together to form a ring comprising 4-6 carbon atoms; polyvinylurethanes having the formula:



wherein each R' is independently hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, or both R' units can be taken together to form a ring comprising 4-6 carbon atoms.

[0073] An example of a D unit wherein the nitrogen of the dye transfer inhibiting moiety is incorporated into the polymer backbone is a poly(2-ethyl-2-oxazoline) having the formula:



wherein the index n indicates the number of monomer residues present.

[0074] The amino-functional polymers of the present invention can comprise any mixture of dye transfer inhibition units which provides the product with suitable properties.

The preferred polymers which comprise D units which are amide moieties are those which have the nitrogen atoms of the amide unit highly substituted so the nitrogen atoms are in effect shielded to a varying degree by the surrounding non-polar groups. This provides the polymers with an amphiphilic character. Non-limiting examples include polyvinylpyrrolidones, polyvinylloxazolidones, N,N-disubstituted polyacrylamides, and N,N-disubstituted polymethacrylamides. A detailed description of physico-chemical properties of some of these polymers are given in "Water-Soluble Synthetic Polymers: Properties and Behavior", Philip Molyneux, Vol. I, CRC Press, (1983) included herein by reference.

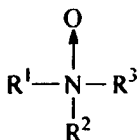
[0075] The amide containing polymers may be present partially hydrolyzed and/or crosslinked forms. A preferred polymeric compound for the present invention is polyvinylpyrrolidone (PVP). This polymer has an amphiphilic character with a highly polar amide group conferring hydrophilic and polar-attracting properties, and also has non-polar methylene and methine groups, in the backbone and/or the ring, conferring hydrophobic properties. PVP is readily soluble in aqueous and organic solvent systems. PVP is available ex ISP, Wayne, New Jersey, and BASF Corp., Parsippany, New Jersey, as a powder or aqueous solutions in several viscosity grades, designated as, e.g., K-12, K-15, K-25, and K-30. These K-values indicate the viscosity average molecular weight, as shown below:

PVP viscosity average molecular weight (in thousands of daltons)	K-12	K-15	K-25	K-30	K-60	K-90
	2.5	10	24	40	160	360

PVP K-12, K-15, and K-30 are also available ex Polysciences, Inc. Warrington, Pennsylvania, PVP K-15, K-25, and K-30 and poly(2-ethyl-2-oxazoline) are available ex Aldrich Chemical Co., Inc., Milwaukee, Wisconsin. PVP K30 (40,000) through to K90 (360,000) are also commercially available ex BASF under the tradename Luviskol or commercially available ex ISP. Still higher molecular PVP like PVP 1.3MM, commercially available ex Aldrich is also suitable for use herein. Yet further PVP-type of material suitable for use in the present invention are polyvinylpyrrolidone-co-dimethylaminoethylmethacrylate, commercially available ex ISP in a quaternised form under the tradename Gafquat® or commercially available ex Aldrich Chemical Co. having a molecular weight of approximately 1.0MM; copolymer of 3-methyl-1-vinyl-1H-imidazolium chloride and 1-vinyl-2-pyrrolidone (30:70) ex BASF under the tradename Luviquat FC370, polyvinylpyrrolidone-co-vinyl acetate, available ex BASF under the tradename Luviskol®, available in vinylpyrrolidone:vinylacetate ratios of from 3:7 to 7:3; polyvinylpyrrolidone-co-vinylimidazoliumquat, commercially available ex BASF under the tradename Luviquat®.

#### Polymers Comprising N-oxide Units

[0076] Another D unit which provides dye transfer inhibition enhancement to the polymers described herein, are N-oxide units having the formula:



wherein R<sup>1</sup>, R<sup>2</sup>, and R<sup>3</sup> can be any hydrocarbly unit (for the purposes of the present invention the term "hydrocarbly"

does not include hydrogen atom alone). The N-oxide unit may be part of a polymer, such as a polyamine, i.e., polyalkyleneamine backbone, or the N-oxide may be part of a pendant group attached to the polymer backbone. An example of a polymer which comprises an the N-oxide unit as a part of the polymer backbone is polyethyleneimine N-oxide. Non-limiting examples of groups which can comprise an N-oxide moiety include the N-oxides of certain heterocycles *inter alia* pyridine, pyrrole, imidazole, pyrazole, pyrazine, pyrimidine, pyridazine, piperidine, pyrrolidine, pyrrolidone, azolidine, morpholine. A preferred polymer is poly(4-vinylpyriding N-oxide, PVNO). In addition, the N-oxide unit may be pendant to the ring, for example, aniline oxide.

[0077] N-oxide comprising polymers of the present invention will preferably have a ratio of N-oxidized amine nitrogen to non-oxidized amine nitrogen of from about 1:0 to about 1:2, preferably to about 1:1, more preferably to about 3:1. The amount of N-oxide units can be adjusted by the formulator. For example, the formulator may co-polymerize N-oxide comprising monomers with non N-oxide comprising monomers to arrive at the desired ratio of N-oxide to non N-oxide amino units, or the formulator may control the oxidation level of the polymer during preparation. The amine oxide unit of the polyamine N-oxides of the present invention have a  $Pk_a$  less than or equal to 10, preferably less than or equal to 7, more preferably less than or equal to 6. The average molecular weight of the N-oxide comprising polymers which provide a dye transfer inhibitor benefit to polymers is from about 500 daltons, preferably from about 10,000 daltons, more preferably from about 20,000 daltons to about 6,000,000 daltons, preferably to about 2,000,000 daltons, more preferably to about 360,000 daltons.

#### Polymers Comprising Amide Units and N-oxide Units

[0078] A further example of polymers which have dye transfer inhibition benefits are polymers which comprise both amide units and N-oxide units as described herein above. Non-limiting examples include co-polymers of two monomers wherein the first monomer comprises an amide unit and the second monomer comprises an N-oxide unit. In addition, oligomers or block polymers comprising these units can be taken together to form the mixed amide/N-oxide polymers.

[0079] However, the resulting polymers must retain the water solubility requirements described herein above.

#### 3)-Urethanes polymers

[0080] Polymers of the urethane type are also suitable components for use herein. A typical disclosure of polyurethane polymer can be found in EP844274A1 as well as in EP839903.

#### 4)-Isomaltooligosaccharide

[0081] Isomaltooligosaccharides (IMO) (including mixtures), the individual components of said mixtures, substituted versions thereof, derivatised versions thereof, and mixtures thereof are suitable components for use herein. Currently IMO is used as corn syrup. These components are particularly suitable where cellulosic fibers/fabrics are used, such as cotton, rayon, ramie, jute, flax, linen, polynosic-fibers, Lyocell (TENCEL®), polyester/cotton blends, other cotton blends, and the like, especially cotton, rayon, linen, polyester/cotton blends, and mixtures thereof.

[0082] Suitable fabric improving actives that are useful in the present invention include oligosaccharides with a degree of polymerization (DP) of from about 1 to about 15, preferably from about 2 to about 10, and wherein each monomer is selected from the group consisting of reducing saccharide containing 5 and/or 6 carbon atoms, including isomaltose, isomaltotriose, isomaltotetraose, isomaltooligosaccharide, fructooligosaccharide, levooligosaccharides, galactooligosaccharide, xylooligosaccharide, gentiooligosaccharides, disaccharides, glucose, fructose, galactose, xylose, mannose, arabinose, rhamnose, maltose, sucrose, lactose, maltulose, ribose, lyxose, allose, altrose, gulose, idose, talose, trehalose, nigerose, kojibiose, lactulose, oligosaccharides, maltooligosaccharides, trisaccharides, tetrasaccharides, pentasaccharides, hexasaccharides, oligosaccharides from partial hydrolysates of natural polysaccharide sources, and the like, and mixtures thereof, preferably mixtures of isomaltooligosaccharides, especially mixtures including isomaltooligosaccharides, comprising from about 3 to about 7 units of glucose, respectively, and which are linked by 1,2- $\alpha$ , 1,3- $\alpha$ , 1,4- $\alpha$ - and 1,6- $\alpha$ -linkages, and mixtures of these linkages. Oligosaccharides containing  $\beta$ -linkages are also preferred. Preferred oligosaccharides are acyclic and have at least one linkage that is not an  $\alpha$ -1,4-glycosidic bond. A preferred oligosaccharide is a mixture containing IMO: from 0 to about 20 % by weight of glucose, from about 10 to about 65 % of isomaltose, from about 1% to about 45% of each of isomaltotriose, isomaltotetraose and isomaltopentaose, from 0 to about 3 % of each of isomaltohexaose, isomaltoheptaose, isomaltooctaose and isomaltotonaose, from about 0.2% to about 15% of each of isomaltohexaose and isomaltoheptaose, and from 0 to about 50 % by weight of said mixture being isomaltooligosaccharides of 2 to 7 glucose units and from 0 to about 10 % by weight of said mixture being isomaltooligosaccharides of about 7 to about 10 glucose units. Other nonlimiting examples of preferred acyclic oligosaccharides, with approximate content by weight percent, are:



Isomaltooligosaccharide Mixture I	
Trisaccharides (maltotriose, panose, isomaltotriose)	40-65%
Disaccharides (maltose, isomaltose)	5-15%
Monosaccharide (glucose)	0-20%
Higher branched sugars ( $4 < DP < 10$ )	10-30%

Isomaltooligosaccharide Mixture II	
Trisaccharides (maltotriose, panose, isomaltotriose)	10-25%
Disaccharides (maltose, isomaltose)	10-55%
Monosaccharide (glucose)	10-20%
Higher branched sugars ( $4 < DP < 10$ )	5-10%

Isomaltooligosaccharide Mixture III	
Tetrasaccharides (stachyose)	10-40%
Trisaccharides (raffinose)	0-10%
Disaccharides (sucrose, trehalose)	10-50%
Monosaccharide (glucose, fructose)	0-10%
Other higher branched sugars ( $4 < DP < 10$ )	0 - 5%

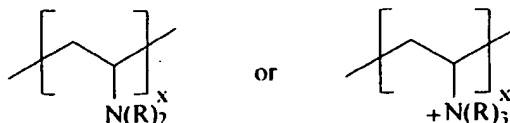
**[0083]** Oligosaccharide mixtures are either prepared by enzymatic reactions or separated as natural products from plant materials. The enzymatic synthesis of oligosaccharides involves either adding monosaccharides, one at a time, to a di- or higher saccharide to produce branched oligosaccharides, or it can involve the degradation of polysaccharides followed by transfer of saccharides to branching positions. For instance, Oligosaccharide Mixtures I and II are prepared by enzymatic hydrolysis of starch to maltooligosaccharides, which are then converted to isomaltooligosaccharides by a transglucosidase reaction. Oligosaccharide Mixture III, for example, is a mixture of oligosaccharides isolated from soybean. Soybean oligosaccharides such as Mixture III, are of pure natural origin.

**[0084]** Substituted and/or derivatised materials of the oligosaccharides listed hereinabove are also suitable in the present invention. Nonlimiting examples of these materials include: carboxyl and hydroxymethyl substitutions (e.g., glucuronic acid instead of glucose); amino oligosaccharides (amine substitution, e.g., glucosamine instead of glucose); cationic quaternized oligosaccharides;  $C_1$ - $C_6$  alkylated oligosaccharides; acetylated oligosaccharide ethers; oligosaccharides having amino acid residues attached (small fragments of glycoprotein); oligosaccharides containing silicone moieties. These substituted and/or derivatised oligosaccharides can provide additional benefits, such as: carboxyl and hydroxymethyl substitutions can introduce readily oxidizable materials on and in the fiber, thus reducing the probability of the fiber itself being oxidized by oxidants, such as bleaches; amine substitution can bind and/or condense with oxidatively damaged regions of the fiber to rejuvenate aged fabrics; acetylated sugar ethers can serve as bleach activators in subsequent processes where hydrogen peroxide is present; oligosaccharides having amino acid residues can improve delivery of fabric care benefits for fabrics containing proteinaceous fibers, e.g., wool and silk; and silicone-derivatised oligosaccharides can provide additional fabric softness and lubricity.  $C_6$  alkyl oligosaccharide is disclosed (along with other higher, viz.,  $C_6$ - $C_{30}$ , alkyl polysaccharides) in U.S. Pat. 4,565,647. Typical disclosure of  $C_1$ - $C_6$  alkylated oligosaccharides can also be found in U.S. 4,488,981. These patents are incorporated herein by reference.

**[0085]** One preferred isomaltooligosaccharide is IMO 900 commercially available from Showa Sangyo Co.)

#### 5)- Polyvinylamines polymers

**[0086]** Polyvinylamines polymers are also suitable component giving a deviation of fabric WRA of at least 15. Typical polyvinylamines polymers include the the quaternized and non-quaternized polyvinylamines having the formula:



wherein R is hydrogen, C1-C12 linear or branched alkyl, benzyl, or alkyleneoxy having the formula (R10)<sub>z</sub>Y, wherein R1 is C1-C6 linear or branched alkylene, Y is hydrogen or an anionic unit, non-limiting examples of which include, -  
 (CH<sub>2</sub>)<sub>f</sub>CO<sub>2</sub>M, -C(O)(CH<sub>2</sub>)<sub>f</sub>CO<sub>2</sub>M, -(CH<sub>2</sub>)<sub>f</sub>PO<sub>3</sub>M, -(CH<sub>2</sub>)<sub>f</sub>OPO<sub>3</sub>M, -(CH<sub>2</sub>)<sub>f</sub>SO<sub>3</sub>M, -CH<sub>2</sub>(CHSO<sub>3</sub>M)-(CH<sub>2</sub>)<sub>f</sub>SO<sub>3</sub>M,  
 -CH<sub>2</sub>(CHSO<sub>2</sub>M)(CH<sub>2</sub>)<sub>f</sub>SO<sub>3</sub>M, -C(O)CH<sub>2</sub>CH(SO<sub>3</sub>M)CO<sub>2</sub>M, -C(O)CH<sub>2</sub>CH(CO<sub>2</sub>M)NHCH(CO<sub>2</sub>M)CH<sub>2</sub>CO<sub>2</sub>M, -C(O)  
 CH<sub>2</sub>CH(CO<sub>2</sub>M)NHCH<sub>2</sub>CO<sub>2</sub>M, -CH<sub>2</sub>CH(OZ)CH<sub>2</sub>O(R1O)<sub>t</sub>Z, -(CH<sub>2</sub>)<sub>f</sub>CH[O(R2O)<sub>t</sub>Z]CH<sub>2</sub>O(R2O)<sub>t</sub>Z, and mixtures there-  
 of, wherein Z is hydrogen or an anionic unit non-limiting examples of which include -(CH<sub>2</sub>)<sub>f</sub>CO<sub>2</sub>M, -C(O)(CH<sub>2</sub>)<sub>f</sub>CO<sub>2</sub>M,  
 -(CH<sub>2</sub>)<sub>f</sub>PO<sub>3</sub>M, -(CH<sub>2</sub>)<sub>f</sub>OPO<sub>3</sub>M, -(CH<sub>2</sub>)<sub>f</sub>SO<sub>3</sub>M, -CH<sub>2</sub>(CHSO<sub>3</sub>M)-(CH<sub>2</sub>)<sub>f</sub>SO<sub>3</sub>M, -CH<sub>2</sub>(CHSO<sub>2</sub>M)(CH<sub>2</sub>)<sub>f</sub>SO<sub>3</sub>M, -C(O)  
 CH<sub>2</sub>CH(SO<sub>3</sub>M)CO<sub>2</sub>M, -C(O)CH<sub>2</sub>CH(CO<sub>2</sub>M)NHCH(CO<sub>2</sub>M)CH<sub>2</sub>CO<sub>2</sub>M, and mixtures thereof, M is a cation which pro-  
 vides charge neutrality; and the index f is from 0 to 6, t is 0 or 1, z is from 1 to 50.

The index x has the value from about 50 to about 1,500; preferably the index x has a value such that the resulting polymeric suds stabilizer has an average molecular weight of from about 2,500, preferably from about 10,000, more preferably from about 20,000 to about 150,000, preferably to about 90,000, more preferably to about 80,000 daltons.

[0087] Most preferred polymers for use in the present invention are water-soluble, including IMO 900 (Isomaltose Oligosaccharide ex. Showa Sangyo Co.), Avalure AC 120 (Polyacrylate ex. BF Goodrich), Luviskol K30, K60 and K85 (Polyvinylpyrrolidone MW 40.000, 400.000 and 1.250.000 ex. BASF), Luvitec VPC 55K65W (copolymer Vinylpyrrolidone & Vinylcaprolactam ex. BASF), Luvitec Quat 73W (copolymer 1-methyl-3-vinyl-imidazolium-methylsulfate & 1-vinyl-2-pyrrolidone ex. BASF), Luviquat FC 905 (copolymer Vinylimidazolium methochloride & Vinylpyrrolidone ex. BASF), Sedipur 520 (modified Polyacrylamide ex. BASF), Chitanide 222 (Chitosan succinamide ex. MIP), Mirasil ADM-E (Aminodimethicone ex. Rhone-Poulenc), Percol 370 (diallyl amine polymer ex. CIBA), Amphomer HC (Acrylate / Octylacrylamide copolymer ex. National Starch), and mixtures thereof.

[0088] More preferably, the water-soluble lubricant and the component, preferably polymer, having a deviation of fabric WRA of at least +15 are present in weight ratios of water-soluble lubricant to component of from 10:1 to 1:1. Indeed, it has been found that within these ratio ranges the resulting composition provides best in wear wrinkle benefit.

#### Optionals

[0089] The composition of the invention may also comprises one or more of the following optional ingredients.

#### 1)- Durable press polymer

[0090] Durable press polymers are optional components of the invention. These polymers can be a cross-linking resin having the property of being cationic. By "cross-linking resin having the property of being cationic", it is meant that the resin is at least partially positively charged. It is not however necessary that the reactive part of the molecule carries the positive charge. Indeed, polymeric resins can be based on positively charged monomers which help the deposition on the fibers.

[0091] Cross-linking resins having the property of being cationic suitable for use herein are those commonly known as having wet strength in the paper field. At least two mechanisms have been postulated to account for the mechanism by which wet strength resin act. One is that wet strength resins form covalent bonds between adjacent fibers while another is that the wet strength resin places a layer over the hydrogen bonds formed between adjacent paper fibers and thus prevents water from breaking the hydrogen bonds.

[0092] Conventional wet-strength agents suitable for use herein include compounds made of epichlorohydrin adducts of polyamine resins, polyethyleneimine resins, cationic starch, polydiallyldimethylammonium chloride, and mixtures thereof, amine-aldehyde resins such as melamine-formaldehyde resin, amide-aldehyde resins, and mixtures thereof. For use within the meaning of the present invention, there can also be used materials of the above-mentioned classes of substances which admittedly do not themselves possess any outstanding wet-strength properties but, nevertheless, have the same durable press effect as do the wet-strength agents as described therein.

[0093] Among the class of epichlorohydrin adducts of polyamine resins, polyethyleneimine resins, cationic starch, polydiallyldimethylammonium chloride, and mixtures thereof, the preferred components are the polymeric amine-epichlorohydrin resins selected from the group consisting of a polyamide-epichlorohydrin (PAE) resin, a polyalkylenepolyamine-epichlorohydrin (PAPAE) resin, and an amine polymer-epichlorohydrin (APE) resin, in which the amine groups have been alkylated with epichlorohydrin to produce a polyamine-epichlorohydrin resin that has azetidinium or epoxide

functionality. Preferably, for use herein, the cross-linking resin having cationic properties is a cationic wet strength resin that is produced by reacting a saturated aliphatic dicarboxylic acid containing three to ten carbon atoms with a polyalkylenepolyamine, containing from two to four ethylene groups, two primary amine groups, and one to three secondary amine groups (such as diethylenetriamine, triethylenetetramine and tetraethylenepentamine), to form a poly(aminoamide) having secondary amine groups that are alkylated with epichlorohydrin to form a PAE resin.

[0094] These polyamide/polyamine/epichlorohydrin wet-strength resins are fully described by Carr, Doane, Hamerstrand and Hofreiter, in an article appearing in the Journal of Applied Polymer Science Vol. 17, pp. 721-735 (1973). Such resins are available as KYMENE from Hercules, Inc. A commercial synthesis of such resins from adipic acid, diethylene triamine and epichlorohydrin is described in the Carr et al publication, *ibid.*, and is U.S. Pat. No. 2,926,154 (Feb. 23, 1960) to G. I. Keim or US 4,240,995. Reference can be made to these publications for further details regarding the preparation of polyamide/polyamine/epichlorohydrin resins.

[0095] Most preferred cross-linking resin having cationic properties from this class are the wet strength resin Kymene 557H (available from Hercules Incorporated), in which adipic acid is reacted with diethylenetriamine to form a poly(aminoamide) that is alkylated and crosslinked with epichlorohydrin to form a PAE resin. Still another preferred cross-linking resin having cationic properties made of epichlorohydrin are Luresin.RTM and Etadurin which both are polyamidoamine-epichlorohydrin resins.

[0096] Amine-aldehyde resins are suitable cross-linking resins for the present invention and are made by condensation of amine or amide monomers with aldehydes such as formaldehyde or glyoxal. Preferred amines are those having low molecular weight amines e.g. melamine or polymeric amines e.g. poly-diallylamine, preferably quarternized. Preferred amides are those polymeric amides such as polyacrylamide. All these suitable amine/amide monomers can also be copolymerized with cationic monomers.

[0097] Among the class of amine-aldehyde cross-linking resin, preferred are those from the class of melamine-formaldehyde resin. Melamine-formaldehyde resins of this type are known as crosslinking agents of this type in the coating industry and are also described, for example, in German Auslegeschrift Nos. 2,457,387 (U.S. Pat. No. 4,035,213 incorporated herein by reference) and 1,719,324 and, in particular, in U.S. Pat. No. 3,242,230 incorporated herein by reference.

[0098] Preferred melamine-formaldehyde resin are those commercially available under the tradenames Madurit, and Cassurit from Clariant.

[0099] Still other preferred cross-linking resin having the property of being cationic among the class of amine-aldehyde cross-linking resin are the Poly(acrylamide-glyoxal) resin commercially available under the tradename SOLIDURIT KM from Clariant.

[0100] According to the present invention, there can also be used a mixture of wet-strength agents of the above-mentioned types or equivalent compounds.

[0101] Preferably for the purpose of the invention, the cross-linking resin having cationic properties have a molecular weight between 200 and 1,000,000, preferably between 500 and 100,000, most preferably between 1000 and 25,000. Cross-linking resin having a low molecular weight are most preferred for use in the present invention as they are more water-soluble and have a better fiber penetration. By low molecular weight it is meant a molecular weight within the range of from 25 to 2000, preferably from 50 to 1000, and more preferably from 50 to 500.

[0102] It is desirable if the level of cross-linking components or derivative thereof is present in an amount of from 0.01% to 60%, preferably from 0.01% to 30% by weight of the total composition

[0103] It is advantageous for aldehyde containing cross-linking resins if a catalyst is used with compositions of the invention. Preferred catalysts includes organic acids such as citric acid, succinic acid, and tartaric acids, as well as conventional Lewis acid such as  $AlCl_3$  or  $MgCl_2$ , or salts thereof, or mixtures thereof. A typical example of catalyst is the catalyst NKD made of a mixture of salts and organic acid, and commercially available from Hoechst.

[0104] It is preferred if the level of catalyst is from 10% to 50%, preferably from 20 to 40% by weight of the cross-linking components or derivative thereof.

[0105] For other cross-linking resins like the Kymene, the use of a catalyst is not necessary.

## (2)Liquid carrier

[0106] Another optional, but preferred, ingredient is a liquid carrier. The liquid carrier employed in the instant compositions is preferably at least primarily water due to its low cost, relative availability, safety, and environmental compatibility. The level of water in the liquid carrier is preferably at least about 50%, most preferably at least about 60%, by weight of the carrier. Mixtures of water and low molecular weight, e.g., <about 200, organic solvent, e.g., lower alcohols such as ethanol, propanol, isopropanol or butanol are useful as the carrier liquid. Low molecular weight alcohols include monohydric, dihydric (glycol, etc.) trihydric (glycerol, etc.), and higher polyhydric (polyols) alcohols.

### (3) Dispersibility Aids

**[0107]** Relatively concentrated compositions containing both saturated and unsaturated diester quaternary ammonium compounds can be prepared that are stable without the addition of concentration aids. However, the compositions of the present invention may require organic and/or inorganic concentration aids to go to even higher concentrations and/or to meet higher stability standards depending on the other ingredients. These concentration aids which typically can be viscosity modifiers may be needed, or preferred, for ensuring stability under extreme conditions when particular softener active levels are used. The surfactant concentration aids are typically selected from the group consisting of (1) single long chain alkyl cationic surfactants; (2) nonionic surfactants; (3) amine oxides; (4) fatty acids; and (5) mixtures thereof. These aids are described in WO 94/20597, specifically on page 14, line 12 to page 20, line 12, which is herein incorporated by reference.

When said dispersibility aids are present, the total level is from 0.1% to 20%, preferably from 0.2% to 10%, more preferably from 0.5% to 5%, and even more preferably from 1% to 2% by weight of the composition. These materials can either be added as part of the active softener raw material, (I), e.g., the mono-long chain alkyl cationic surfactant and/or the fatty acid which are reactants used to form the biodegradable fabric softener active as discussed hereinbefore, or added as a separate component. The total level of dispersibility aid includes any amount that may be present as part of component (I).

**[0108]** Inorganic viscosity/dispersibility control agents which can also act like or augment the effect of the surfactant concentration aids, include water-soluble, ionizable salts which can also optionally be incorporated into the compositions of the present invention. A wide variety of ionizable salts can be used. Examples of suitable salts are the halides of the Group IA and IIA metals of the Periodic Table of the Elements, e.g., calcium chloride, magnesium chloride, sodium chloride, potassium bromide, and lithium chloride. The ionizable salts are particularly useful during the process of mixing the ingredients to make the compositions herein, and later to obtain the desired viscosity. The amount of ionizable salts used depends on the amount of active ingredients used in the compositions and can be adjusted according to the desires of the formulator. Typical levels of salts used to control the composition viscosity are from about 20 to about 20,000 parts per million (ppm), preferably from about 20 to about 11,000 ppm, by weight of the composition. Alkylene polyammonium salts can be incorporated into the composition to give viscosity control in addition to or in place of the water-soluble, ionizable salts above. In addition, these agents can act as scavengers, forming ion pairs with anionic detergent carried over from the main wash, in the rinse, and on the fabrics, and may improve softness performance. These agents may stabilize the viscosity over a broader range of temperature, especially at low temperatures, compared to the inorganic electrolytes.

Specific examples of alkylene polyammonium salts include L-lysine monohydrochloride and 1,5-diammonium 2-methyl pentane dihydrochloride.

### (4)-Stabilizers

**[0109]** Stabilizers can be present in the compositions of the present invention. The term "stabilizer," as used herein, includes antioxidants and reductive agents. These agents are present at a level of from 0% to about 2%, preferably from about 0.01% to about 0.2%, more preferably from about 0.035% to about 0.1% for antioxidants, and more preferably from about 0.01% to about 0.2% for reductive agents. These assure good odor stability under long term storage conditions for the compositions and compounds stored in molten form. The use of antioxidants and reductive agent stabilizers is especially critical for low scent products (low perfume).

**[0110]** Examples of antioxidants that can be added to the compositions of this invention include a mixture of ascorbic acid, ascorbic palmitate, propyl gallate, available from Eastman Chemical Products, Inc., under the trade names Tenox® PG and Tenox S-1; a mixture of BHT (butylated hydroxytoluene), BHA (butylated hydroxyanisole), propyl gallate, and citric acid, available from Eastman Chemical Products, Inc., under the trade name Tenox-6; butylated hydroxytoluene, available from UOP Process Division under the trade name Sustane® BHT; tertiary butylhydroquinone, Eastman Chemical Products, Inc., as Tenox TBHQ; natural tocopherols, Eastman Chemical Products, Inc., as Tenox GT-1/GT-2; and butylated hydroxyanisole, Eastman Chemical Products, Inc., as BHA; long chain esters (C<sub>8</sub>-C<sub>22</sub>) of gallic acid, e.g., dodecyl gallate; Irganox® 1010; Irganox® 1035; Irganox® B 1171; Irganox® 1425; Irganox® 3114; Irganox® 3125; and mixtures thereof; preferably Irganox® 3125, Irganox® 1425, Irganox® 3114, and mixtures thereof; more preferably Irganox® 3125 alone. The chemical names and CAS numbers for some of the above stabilizers are listed in Table II below.

TABLE II

Antioxidant	CAS No.	Chemical Name used in Code of Federal Regulations
Irganox® 1010	6683-19-8	Tetrakis (methylene(3,5-di-tert-butyl-4 hydroxyhydrocinnamate)) methane
Irganox® 1035	41484-35-9	Thiodiethylene bis(3,5-di-tert-butyl-4-hydroxyhydrocinnamate
Irganox® 1098	23128-74-7	N,N'-Hexamethylene bis(3,5-di-tert-butyl-4-hydroxyhydrocinnamide
Irganox® B 1171	31570-04-4 23128-74-7	1:1 Blend of Irganox® 1098 and Irgafos® 168
Irganox® 1425	65140-91-2	Calcium bis(monoethyl(3,5-di-tert-butyl-4-hydroxybenzyl) phosphonate)
Irganox® 3114	65140-91-2	Calcium bis(monoethyl(3,5-di-tert-butyl-4-hydroxybenzyl)phosphonate)
Irganox® 3125 acid	34137-09-2	3,5-Di-tert-butyl-4-hydroxy-hydrocinnamic
Irgafos® 168	31570-04-4	triester with 1,3,5-tris(2-hydroxyethyl)-S-triazine-2,4,6-(1H, 3H, 5H)-trione Tris(2,4-di-tert-butyl-phenyl)phosphite

[0111] Examples of reductive agents include sodium borohydride, hypophosphorous acid, Irgafos® 168, and mixtures thereof.

## 5- PRESERVATIVE

[0112] Optionally, but preferably, antimicrobial preservative can be added to the composition of the present invention. Contamination by certain microorganisms with subsequent microbial growth can result in an unsightly and/or malodorous solution. Because microbial growth in solutions is highly objectionable when it occurs, it is highly preferable to include an antimicrobial preservative, which is effective for inhibiting and/or regulating microbial growth in order to increase storage stability of the composition.

[0113] It is preferable to use a broad spectrum preservative, e.g., one that is effective on both bacteria (both gram positive and gram negative) and fungi. A limited spectrum preservative, e.g., one that is only effective on a single group of microorganisms, e.g., fungi, can be used in combination with a broad spectrum preservative or other limited spectrum preservatives with complimentary and/or supplementary activity. A mixture of broad spectrum preservatives can also be used. In some cases where a specific group of microbial contaminants is problematic (such as Gram negatives), aminocarboxylate chelators, such as those described hereinbefore, can be used alone or as potentiators in conjunction with other preservatives. These chelators which include, e.g., ethylenediaminetetraacetic acid (EDTA), hydroxyethylenediaminetriacetic acid, diethylenetriaminepentaacetic acid, and other aminocarboxylate chelators, and mixtures thereof, and their salts, and mixtures thereof, can increase preservative effectiveness against Gram-negative bacteria, especially *Pseudomonas* species.

[0114] Antimicrobial preservatives useful in the present invention include biocidal compounds, i.e., substances that kill microorganisms, or biostatic compounds, i.e., substances that inhibit and/or regulate the growth of microorganisms. Well known preservatives such as short chain alkyl esters of p-hydroxybenzoic acid, commonly known as parabens; N-(4-chlorophenyl)-N'-(3,4-dichlorophenyl) urea, also known as 3,4,4'-trichlorocarbanilide or triclocarban; 2,4,4'-trichloro-2'-hydroxy diphenyl ether, commonly known as triclosan are useful preservative in the present invention.

[0115] Still other preferred preservatives are the water-soluble preservatives, i.e. those that have a solubility in water of at least about 0.3 g per 100 ml of water, i.e., greater than about 0.3% at room temperature, preferably greater than about 0.5% at room temperature.

[0116] The preservative in the present invention is included at an effective amount. The term "effective amount" as herein defined means a level sufficient to prevent spoilage, or prevent growth of inadvertently added microorganisms, for a specific period of time. In other words, the preservative is not being used to kill microorganisms on the surface onto which the composition is deposited in order to eliminate odors produced by microorganisms. Instead, it is preferably being used to prevent spoilage of the solution in order to increase the shelf-life of the composition. Preferred levels of preservative are from about 0.0001% to about 0.5%, more preferably from about 0.0002% to about 0.2%, most preferably from about 0.0003% to about 0.1%, by weight of the usage composition.

[0117] The preservative can be any organic preservative material which will not cause damage to fabric appearance, e.g., discoloration, coloration, bleaching. Preferred water-soluble preservatives include organic sulfur compounds, halogenated compounds, cyclic organic nitrogen compounds, low molecular weight aldehydes, quaternary ammonium compounds, dehydroacetic acid, phenyl and phenolic compounds, and mixtures thereof. Non-limiting examples of

preferred water-soluble preservatives for use in the present invention can be found in U.S. Patent 5,714,137, incorporated hereinbefore by reference, as well as co-pending application PCT/US 98/12154 pages 29 to 36.

[0118] Preferred water-soluble preservatives for use in the present invention are organic sulfur compounds. Some non-limiting examples of organic sulfur compounds suitable for use in the present invention are:

#### (a) 3-Isothiazolone Compounds

[0119] A preferred preservative is an antimicrobial, organic preservative containing 3-isothiazolone groups. This class of compounds is disclosed in U.S. Pat. No. 4,265,899, Lewis et al., issued May 5, 1981, and incorporated herein by reference. A preferred preservative is a water-soluble mixture of 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one, more preferably a mixture of about 77% 5-chloro-2-methyl-4-isothiazolin-3-one and about 23% 2-methyl-4-isothiazolin-3-one, a broad spectrum preservative available as a 1.5% aqueous solution under the trade name Kathon® CG by Rohm and Haas Company.

[0120] When Kathon® is used as the preservative in the present invention it is present at a level of from about 0.0001% to about 0.01%, preferably from about 0.0002% to about 0.005%, more preferably from about 0.0003% to about 0.003%, most preferably from about 0.0004% to about 0.002%, by weight of the composition.

[0121] Other isothiazolins include 1,2-benzisothiazolin-3-one, available under the trade name Proxel® products; and 2-methyl-4,5-trimethylene-4-isothiazolin-3-one, available under the trade name Promexal®. Both Proxel and Promexal are available from Zeneca. They have stability over a wide pH range (i.e., 4-12). Neither contain active halogen and are not formaldehyde releasing preservatives. Both Proxel and Promexal are effective against typical Gram negative and positive bacteria, fungi and yeasts when used at a level from about 0.001% to about 0.5%, preferably from about 0.005% to about 0.05%, and most preferably from about 0.01% to about 0.02% by weight of the usage composition.

#### (b) Sodium Pyrithione.

[0122] Another preferred organic sulfur preservative is sodium pyrithione, with water solubility of about 50%. When sodium pyrithione is used as the preservative in the present invention it is typically present at a level of from about 0.0001% to about 0.01%, preferably from about 0.0002% to about 0.005%, more preferably from about 0.0003% to about 0.003%, by weight of the usage composition.

[0123] Mixtures of the preferred organic sulfur compounds can also be used as the preservative in the present invention.

#### 6- Antimicrobial active

[0124] The composition may suitably use an optional solubilized, water-soluble antimicrobial active, useful in providing protection against organisms that become attached to the treated material. The free, uncomplexed antimicrobial, e.g., antibacterial, active provides an optimum antibacterial performance.

[0125] Sanitization of fabrics can be achieved by the compositions of the present invention containing, antimicrobial materials, e.g., antibacterial halogenated compounds, quaternary compounds, and phenolic compounds.

[0126] Biguanides. Some of the more robust antimicrobial halogenated compounds which can function as disinfectants/sanitizers as well as finish product preservatives (vide infra), and are useful in the compositions of the present invention include 1,1'-hexamethylene bis(5-(p-chlorophenyl)biguanide), commonly known as chlorhexidine, and its salts, e.g., with hydrochloric, acetic and gluconic acids. The digluconate salt is highly water-soluble, about 70% in water, and the diacetate salt has a solubility of about 1.8% in water. When chlorhexidine is used as a sanitizer in the present invention it is typically present at a level of from about 0.001% to about 0.4%, preferably from about 0.002% to about 0.3%, and more preferably from about 0.01% to about 0.1%, by weight of the usage composition. In some cases, a level of from about 1% to about 2% may be needed for virucidal activity.

[0127] Other useful biguanide compounds include Cosmocil® CQ®, Vantocil® IB, including poly (hexamethylene biguanide) hydrochloride. Other useful cationic antimicrobial agents include the bis-biguanide alkanes. Usable water soluble salts of the above are chlorides, bromides, sulfates, alkyl sulfonates such as methyl sulfonate and ethyl sulfonate, phenylsulfonates such as p-methylphenyl sulfonates, nitrates, acetates, gluconates, and the like.

[0128] As stated hereinbefore, the bis biguanide of choice is chlorhexidine and its salts, e.g., digluconate, dihydrochloride, diacetate, and mixtures thereof.

[0129] Quaternary Compounds. A wide range of quaternary compounds can also be used as antimicrobial actives, in conjunction with the preferred surfactants, for compositions of the present invention that do not contain cyclodextrin. Non-limiting examples of useful quaternary compounds include: (1) benzalkonium chlorides and/or substituted benzalkonium chlorides such as commercially available Barquat® (available from Lonza), Maquat® (available from Mason), Variquat® (available from Witco/Sherex), and Hyamine® (available from Lonza); (2) dialkyl quaternary such as Bardac®

products of Lonza, (3) N-(3-chloroallyl) hexaminium chlorides such as Dowicide® and Dowicil® available from Dow; (4) benzethonium chloride such as Hyamine® 1622 from Rohm & Haas; (5) methylbenzethonium chloride represented by Hyamine® 10X supplied by Rohm & Haas, (6) cetylpyridinium chloride such as Cepacol chloride available from Merrell Labs. Typical concentrations for biocidal effectiveness of these quaternary compounds range from about 0.001% to about 0.8%, preferably from about 0.005% to about 0.3%, more preferably from about 0.01% to 0.2%, by weight of the usage composition. The corresponding concentrations for the concentrated compositions are from about 0.003% to about 2%, preferably from about 0.006% to about 1.2%, and more preferably from about 0.1 % to about 0.8% by weight of the concentrated compositions.

[0130] Other preservatives which are conventional in the art, such as described in US 5,593, 670 incorporated herein by reference, may also be used herein.

## 7-Perfume

[0131] The present invention can contain a perfume. Suitable perfumes are disclosed in U.S. Pat. 5,500,138, said patent being incorporated herein by reference.

[0132] As used herein, perfume includes fragrant substance or mixture of substances including natural (i.e., obtained by extraction of flowers, herbs, leaves, roots, barks, wood, blossoms or plants), artificial (i.e., a mixture of different nature oils or oil constituents) and synthetic (i.e., synthetically produced) odoriferous substances. Such materials are often accompanied by auxiliary materials, such as fixatives, extenders, stabilizers and solvents. These auxiliaries are also included within the meaning of "perfume", as used herein. Typically, perfumes are complex mixtures of a plurality of organic compounds.

[0133] Examples of perfume ingredients useful in the perfumes of the present invention compositions include, but are not limited to, hexyl cinnamic aldehyde; amyl cinnamic aldehyde; amyl salicylate; hexyl salicylate; terpineol; 3,7-dimethyl-*cis*-2,6-octadien-1-ol; 2,6-dimethyl-2-octanol; 2,6-dimethyl-7-octen-2-ol; 3,7-dimethyl-3-octanol; 3,7-dimethyl-*trans*-2,6-octadien-1-ol; 3,7-dimethyl-6-octen-1-ol; 3,7-dimethyl-1-octanol; 2-methyl-3-(para-*tert*-butylphenyl)-propionaldehyde; 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde; tricyclodecanyl propionate; tricyclodecanyl acetate; anisaldehyde; 2-methyl-2-(para-*iso*-propylphenyl)-propionaldehyde; ethyl-3-methyl-3-phenyl glycidate; 4-(para-hydroxyphenyl)-butan-2-one; 1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one; para-methoxyacetophenone; para-methoxy- $\alpha$ -phenylpropene; methyl-2-*n*-hexyl-3-oxo-cyclopentane carboxylate; undecalactone gamma.

[0134] Additional examples of fragrance materials include, but are not limited to, orange oil; lemon oil; grapefruit oil; bergamot oil; clove oil; dodecalactone gamma; methyl-2-(2-pentyl-3-oxo-cyclopentyl) acetate; beta-naphthol methyl ether; methyl-beta-naphthylketone; coumarin; decylaldehyde; benzaldehyde; 4-*tert*-butylcyclohexyl acetate; alpha, alpha-dimethylphenethyl acetate; methylphenylcarbonyl acetate; Schiff's base of 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde and methyl anthranilate; cyclic ethyleneglycol diester of tridecandioic acid; 3,7-dimethyl-2,6-octadiene-1-nitrile; ionone gamma methyl; ionone alpha; ionone beta; petitgrain; methyl cedrylone; 7-acetyl-1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethyl-naphthalene; ionone methyl; methyl-1,6,10-trimethyl-2,5,9-cyclododecatrien-1-yl ketone; 7-acetyl-1,1,3,4,4,6-hexamethyl tetralin; 4-acetyl-6-*tert*-butyl-1,1-dimethyl indane; benzophenone; 6-acetyl-1,1,2,3,3,5-hexamethyl indane; 5-acetyl-3-isopropyl-1,1,2,6-tetramethyl indane; 1-dodecanal; 7-hydroxy-3,7-dimethyl octanal; 10-undecen-1-al; iso-hexenyl cyclohexyl carboxaldehyde; formyl tricyclodecan; cyclopentadecanolide; 16-hydroxy-9-hexadecenoic acid lactone; 1,3,4,6,7,8-hexahydro-4,6,6,7,8-hexamethylcyclopenta-gamma-2-benzopyrane; ambroxane; dodecahydro-3a,6,6,9a-tetramethylnaphtho-[2,1b]furan; cedrol; 5-(2,2,3-trimethylcyclopent-3-enyl)-3-methylpentan-2-ol; 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol; caryophyllene alcohol; cedryl acetate; para-*tert*-butylcyclohexyl acetate; patchouli; olibanum resinoid; labdanum; vetiver; copaiba balsam; fir balsam; and condensation products of: hydroxycitronellal and methyl anthranilate; hydroxycitronellal and indol; phenyl acetaldehyde and indol; 4-(4-hydroxy-4-methyl pentyl)-3-cyclohexene-1-carboxaldehyde and methyl anthranilate. More examples of perfume components are geraniol; geranyl acetate; linalool; linalyl acetate; tetrahydrolinalool; citronellol; citronellyl acetate; dihydromyrcenol; dihydromyrcenyl acetate; tetrahydromyrcenol; terpinyl acetate; nopol; nopyl acetate; 2-phenylethanol; 2-phenylethyl acetate; benzyl alcohol; benzyl acetate; benzyl salicylate; benzyl benzoate; styralyl acetate; dimethylbenzylcarbinol; trichloromethylphenylcarbonyl methylphenylcarbonyl acetate; isononyl acetate; vetiveryl acetate; vetiverol; 2-methyl-3-(*p*-*tert*-butylphenyl)-propanal; 2-methyl-3-(*p*-isopropylphenyl)-propanal; 3-(*p*-*tert*-butylphenyl)-propanal; 4-(4-methyl-3-pentenyl)-3-cyclohexenecarbaldehyde; 4-acetoxy-3-pentyltetrahydropyran; methyl dihydrojasmonate; 2-*n*-heptylcyclopentanone; 3-methyl-2-pentyl-cyclopentanone; *n*-decanal; *n*-dodecanal; 9-decenol-1; phenoxyethyl isobutyrate; phenylacetaldehyde dimethylacetal; phenylacetaldehyde diethylacetal; geranonitrile; citronellonitrile; cedryl acetal; 3-isocamphylcyclohexanol; cedryl methylether; isolongifolanone; aubepine nitrile; aubepine; heliotropine; eugenol; vanillin; diphenyl oxide; hydroxycitronellal ionones; methyl ionones; isomethyl ionones; irones; *cis*-3-hexenol and esters thereof; indane musk fragrances; tetralin musk fragrances; isochroman musk fragrances; macrocyclic ketones; macrolactone musk fragrances; ethylene brassylate.

[0135] The perfumes useful in the present invention compositions are substantially free of halogenated materials and nitromusks.

[0136] Suitable solvents, diluents or carriers for perfumes ingredients mentioned above are for examples, ethanol, isopropanol, diethylene glycol, monoethyl ether, dipropylene glycol, diethyl phthalate, triethyl citrate, etc. The amount of such solvents, diluents or carriers incorporated in the perfumes is preferably kept to the minimum needed to provide a homogeneous perfume solution.

[0137] Perfume can be present at a level of from 0% to 10%, preferably from 0.1% to 5%, and more preferably from 0.2% to 3%, by weight of the finished composition. Fabric softener compositions of the present invention provide improved fabric perfume deposition.

[0138] Perfume ingredients may also be suitably added as releasable fragrances, for example, as pro-perfumes or pro-fragrances as described in U.S. 5,652,205 Hartman *et al.*, issued July 29, 1997, WO95/04809, WO96/02625, PCT US97/14610 filed 19 August 1997 and claiming priority of 19 August 1996, EP-A-0,752,465, co-pending application EP 98870227.0, EP 98870226.2, EP 98870026.4, and EP 98870025.6; all incorporated herein by reference.

## 8- Soil Release Agent

[0139] Soil Release agents are desirably used in compositions of the instant invention. Any polymeric soil release agent known to those skilled in the art can optionally be employed in the compositions of this invention. Polymeric soil release agents are characterized by having both hydrophilic segments, to hydrophilize the surface of hydrophobic fibers, such as polyester and nylon, and hydrophobic segments, to deposit upon hydrophobic fibers and remain adhered thereto through completion of washing and rinsing cycles and, thus, serve as an anchor for the hydrophilic segments. This can enable stains occurring subsequent to treatment with the soil release agent to be more easily cleaned in later washing procedures.

[0140] If utilized, soil release agents will generally comprise from about 0.01% to about 10.0%, by weight, of the detergent compositions herein, typically from about 0.1% to about 5%, preferably from about 0.2% to about 3.0%.

[0141] The following, all included herein by reference, describe soil release polymers suitable for use in the present invention. U.S. 3,959,230 Hays, issued May 25, 1976; U.S. 3,893,929 Basadur, issued July 8, 1975; U.S. 4,000,093, Nicol, *et al.*, issued December 28, 1976; U.S. Patent 4,702,857 Gosselink, issued October 27, 1987; U.S. 4,968,451, Scheibel *et al.*, issued November 6; U.S. 4,702,857, Gosselink, issued October 27, 1987; U.S. 4,711,730, Gosselink *et al.*, issued December 8, 1987; U.S. 4,721,580, Gosselink, issued January 26, 1988; U.S. 4,877,896, Maldonado *et al.*, issued October 31, 1989; U.S. 4,956,447, Gosselink *et al.*, issued September 11, 1990; U.S. 5,415,807 Gosselink *et al.*, issued May 16, 1995; European Patent Application 0 219 048, published April 22, 1987 by Kud, *et al.*

[0142] Further suitable soil release agents are described in U.S. 4,201,824, Violland *et al.*; U.S. 4,240,918 Lagasse *et al.*; U.S. 4,525,524 Tung *et al.*; U.S. 4,579,681, Ruppert *et al.*; U.S. 4,240,918; U.S. 4,787,989; U.S. 4,525,524; EP 279,134 A, 1988, to Rhone-Poulenc Chemie; EP 457,205 A to BASF (1991); and DE 2,335,044 to Unilever N. V., 1974 all incorporated herein by reference.

[0143] Commercially available soil release agents include the METOLOSE SM100, METOLOSE SM200 manufactured by Shin-etsu Kagaku Kogyo K.K., SOKALAN type of material, e.g., SOKALAN HP-22, available from BASF (Germany), ZELCON 5126 (from Dupont) and MILEASE T (from ICI).

## 9-pH

[0144] An optional requirement of the compositions according to the present invention is that the pH as measured in the neat compositions at 20 °C, is greater than 3, preferably between 3 and 12, more preferably between 4 and 8, most preferably is of 5. This range is preferred for fabric safety. The pH of these compositions herein can be regulated by the addition of a Bronsted acid.

## 10- Other Optional Ingredients

[0145] The present invention can include optional components conventionally used in textile treatment compositions, for example, humectants like diethylene glycol, and/or salts like lithium salts, colorants, bactericides, optical brighteners, opacifiers, anti-shrinkage agents, germicides, fungicides, anti-oxidants, color protection agent like dye fixing agent as described in EP 931133, enzymes, chelating agents, cyclodextrin as described in WO 98/56888, metallic salts to absorb amine and sulfur-containing compounds and selected from the group consisting of copper salts, zinc salts, and mixtures thereof, water-soluble polyionic polymers, e.g., water-soluble cationic polymer like polyamines, and water-soluble anionic polymers like polyacrylic acids, other antistatic agent, insect and/or moth repelling agents, colorants and dyes, anti-clogging agent, and the like; typical disclosure of which can be found in WO 98/56888. Still other suitable optional ingredients are ingredients which provide shield protection against stain like hydroxypropylcellulose as well as other



cellulosic polymer like carboxymethylcellulose. The compositions are preferably free of any material that would soil or stain fabric, and are also substantially free of starch. Typically, there should be less than about 0.5%, by weight of the composition, preferably less than about 0.3%, more preferably less than about 0.1%, by weight of the composition, of starch and/or modified starch.

#### Form of the composition

[0146] The composition of the invention may take a variety of physical form including liquid, liquid-gel, paste-like, foam in either aqueous or non-aqueous form, powder like granular and tablet forms. A preferred form of the composition is in a liquid form.

[0147] When in a liquid form, the composition is preferably dispensed by a dispensing means such as a spray dispenser, aerosol dispenser, or refill thereof. Still another preferred dispensing means is by incorporation of the composition of the invention in the ironing tank per se, or via a cartridge preferably adapted for the iron.

#### Spray Dispenser

[0148] The present invention also relates to such compositions incorporated into a spray dispenser to create an article of manufacture that can facilitate treatment of fabric articles and/or surfaces with the compositions according to the invention at a level that is effective. The spray dispenser comprises manually activated and non-manual powered (operated) spray means and a container containing the treating composition. Typical disclosure of such spray dispenser can be found in WO 96/04940 page 19 line 21 to page 22 line 27. Preferably, the spray dispenser is selected from spray dispenser comprising battery operated pump, spray dispenser comprising a trigger spray device, spray dispenser comprising a pressurized aerosol spray dispenser.

#### Method of use

[0149] It has been found that the use of the water-soluble lubricant provided a reduction of the WRA compared to water. Accordingly, there is provided a method of increasing the WRA of fabrics, which comprises the steps of contacting the fabrics with a water-soluble lubricant as defined herein before, using a domestic process.

[0150] It has also been found that the use of the water-soluble lubricant or composition of the invention provides surprisingly good benefit on the dewrinkling performance upon wearing. This benefit is particularly achieved while spraying the compound or composition from the iron. Accordingly, there is also provided a method of treating fabrics, in particular to provide in wear wrinkle resistance on fabrics, which comprises the steps of contacting the fabrics with a water-soluble lubricant or composition according to the invention, as defined herein before, using a domestic process.

[0151] By "contacting", it is meant any steps that is suitable for providing a contact of the composition with the fabric. This can include by soaking, washing, rinsing, and/or spraying as well as by means of a dryer sheet onto which is adsorbed the composition. Preferably, the contacting occurs after the laundering and optional drying of the fabrics, e. g. by spraying, more preferably by spraying from the iron spray dispenser and/or via the vaporisation holes from the iron sole. Accordingly, in this instance, the composition of the present invention is used as an ironing aid. An effective amount of the composition can be sprayed onto fabric, wherein said fabric should not be sprayed to saturation. Still another preferred way of treating the fabrics is when the fabric can be sprayed with an effective amount of the composition, allowed to dry and then ironed, or sprayed and ironed immediately.

[0152] Accordingly, in a further aspect of the invention, the composition of the invention can also be sprayed onto the fabrics by means of an iron spraying means, whereby the composition is incorporated into the iron as is or via a cartridge, preferably adapted for the iron. As for the method of spraying via the iron, the spraying means should preferably be capable of providing droplets with a weight average diameter of from about 40 to about 200  $\mu\text{m}$ , preferably from about 70 to about 150  $\mu\text{m}$ . Preferably, the loading of moisture on fabrics made of natural and synthetic fibers is from about 5 to about 25%, more preferably from about 5 to about 10% by weight of the dried fabric.

[0153] By "wrinkle reducing composition", it is meant that the composition is tested on 100% cotton, woven Oxford pinpoint fabric according to the procedure given in W. Garner, Textile Laboratory Manual Vol. 6, Ed. 3, Elsevier Inc., 1967, p. 105, so called "cylinder test". The cylinder test consists in taking a 12X14 inch of treated cloth, rolling it round a plastic tube, placing the roll in a 360 ml measuring cylinder ( $r = 0.67$  inch,  $l = 15.7$  inch), withdrawing the tube, and pushing the fabric down to occupy a volume of about 90 ml by means of a plastic tube which is an easy sliding fit for the cylinder. This test is carried out on cloth conditioned for 24 hours at 21°C (70°F) and 65% RH. The cloth is left 1 minute in the cylinder, opened immediately, inspected visually, and then compared with a cloth only treated with water. The results obtained are compared against fabrics which have only been treated with water. Wrinkle reducing compositions are compositions which provide a better crease resistance versus water, i.e fabrics that have been treated with a composition of the invention show less wrinkles compared to fabrics which have only been treated with water.

**[0154]** In a still further aspect of the invention, the composition can be sprayed onto fabrics by an in-home de-wrinkling chamber containing the fabric to be dewrinkled, thereby providing ease of operation. Conventional personal as well as industrial de-wrinkling apparatuses are suitable for use herein. Traditionally, these apparatuses act by a steaming process which effects a relaxation of the fibers. Examples of home dewrinkling chambers include shower stalls. The spraying of the composition or compounds onto the fabrics can then occur within the chamber of the apparatus or before placing the fabrics into the chamber. As for the manual method of spraying, the spraying means should preferably be capable of providing droplets with a weight average diameter of from about 8 to about 100  $\mu\text{m}$ , preferably from about 10 to about 50  $\mu\text{m}$ . Preferably, the loading of moisture on fabrics made of natural and synthetic fibers is from about 5 to about 25%, more preferably from about 5 to about 10% by weight of the dried fabric. Other conventional steps that can be carried out in the dewrinkling apparatus can be applied such as heating which will provide the curing step and drying. Preferably, for optimum dewrinkling benefit, the temperature profile inside the chamber ranges from about 40°C to about 80°C, more preferably from about 50°C to about 70°C. The preferred length of the drying cycle is from about 15 to about 60 minutes, more preferably from about 20 to about 45 minutes.

**[0155]** The steaming step in the dewrinkling apparatus can also be eliminated if the composition is maintained at a temperature range from about 22°C (about 72° F) to about 76°C (170°F) before spraying.

**[0156]** The present invention encompasses the method of spraying a mist of an effective amount of solution of the invention composition onto fabric and/or fabric articles. Preferably, said fabric and/or fabric articles include, but are not limited to, clothes, curtains, drapes, upholstered furniture, carpeting, bed linens, bath linens, tablecloths, sleeping bags, tents, car interiors, etc.

**[0157]** The compositions herein are especially useful, when used to treat garments for extending the time before another wash cycle is needed, and/or even reducing the time involved in ironing. Such garments include uniforms and other garments which are normally treated in an industrial process, which can be dewrinkled and the time between treatments extended.

**[0158]** Also provided herein is an article of manufacture comprising a container and the composition of the invention in association with a set of instructions to use the composition in an amount effective to provide a solution to problems involving and/or provision of a benefit related to those selected from reducing wrinkles; imparting in-wear resistance to fabrics. It is important that the consumer be aware of these additional benefits, since otherwise the consumer would not know that the composition would solve these problems and/or provide these benefits.

**[0159]** As used herein, the phrase "in association with" means the set of instructions are either directly printed on the container itself or presented in a separate manner including, but not limited to, a brochure, print advertisement, electronic advertisement, and/or verbal communication, so as to communicate the set of instructions to a consumer of the article of manufacture. The set of instructions preferably comprises the instruction to apply an effective amount of the composition, preferably by spraying, to provide the indicated benefit, e.g. wrinkles reduction; imparting in-wear resistance to fabrics.

**[0160]** The invention is illustrated in the following non limiting examples, in which all percentages are on a weight basis unless otherwise stated.

**[0161]** In the examples, the abbreviated component identifications have the following meanings:

Polymer 1: Isomalto oligosaccharide available from Showa Sangyo Co. under the trade name IMO 900

Polymer 2: Polyvinylpyrrolidone available from BASF under the trade name Luviskol K30

Polymer 3: Co-polymer of vinylpyrrolidone and vinylcaprolactame available from BASF under the trade name Luvitec VPC

Polymer 4: Co-polymer of vinylpyrrolidone and vinylimidazolium methachloride available from BASF under the trade name Luviquat FC 905

Lubricant 1: Polyalkylene oxide polysiloxane commercially available under the tradename of Silwet 7200 from OSI Chem./Witco

Lubricant 2: Polyalkylene oxide polysiloxane commercially available under the tradename of Silwet 7657 from OSI Chem./Witco

Lubricant 3: Polyethoxylated (20 moles) sorbitan monolaurate commercially available under the tradename of Radasurf 7137 from FINA

Lubricant 4: Polyethoxylated (20 moles) sorbitan tristearate commercially available under the tradename of Tween

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Wetting agent 1: Polyalkylene oxide polysiloxane commercially available under the tradename of Silwet 7600 from OSI Chem./Witco

Wetting agent 1: Polyalkylene oxide polysiloxane commercially available under the tradename of Silwet L 77 from OSI Chem./Witco

Emulsifier 1: CAE 10 (coconut alcohol condensed with an average of 10 moles of ethylene oxide)

	A	B	C	D	E	F
Polymer #1	5%	-	-	-	-	1%
Polymer #2	-	1%	-	2%	-	-
Polymer #3	-	-	2%	-	-	-
Polymer #4	-	-	-	-	0.5 %	-
Lubricant #1	14%	4%	-	-	1.5%	-
Lubricant #2	-	-	6%	2%	1.5%	-
Lubricant #3	8 %	2 %	-	-	-	5%
Lubricant #4	-	-	-	3 %	-	-
Wetting agent 1	3 %	0.5	-	-	0.2 %	-
Wetting agent 2	-	-	0.5 %	-	-	-
Dipropyleneglycol	-	0.3	-	-	-	-
Emulsifier 1	0.6 %	0.2	-	-	-	-
Cyclodextrin	-	0.5	1 %	-	-	-
Preservative	3 ppm	3 ppm	-	3 ppm	-	-
Perfume	0.5 %	0.1	0.1 %	-	-	0.2%
Water	Balance	Balance	Balance	Balance	Balance	Balance

## Claims

1. A fabric wrinkle reducing composition comprising a water-soluble lubricant and a component having a deviation of fabric Wrinkle Recovery angle (WRA) versus water of at least +15.
2. A composition according to Claim 1, wherein the water-soluble lubricant is selected from nonionic silicone containing surfactants, sorbitan esters, ethoxylated sorbitan esters, and mixtures thereof.
3. A composition according to either one of Claim 1 or 2, wherein the water-soluble lubricant is present in an amount of from 0.1% to 70% by weight of the composition.
4. A composition according to any one of Claims 1-3, wherein the component having a deviation of fabric WRA versus water of at least 15 is a polymer, preferably selected from shape retention polymers, polymers comprising at least one unit which provide a dye transfer inhibiting benefit, urethane polymers, isomalto oligosaccharide, polyvinylamine polymers, and mixtures thereof.
5. A composition according to any one of Claims 1-4, wherein the component having a deviation of fabric WRA versus water of at least +15 is present in an amount of at least about 0.01%, preferably from about 0.1% to about 20%, preferably to about 10% by weight of the composition.
6. A composition according to any one of Claims 1-5, wherein the water-soluble lubricant and the component having a deviation of fabric WRA versus water of at least +15 are present in a weight ratio of from 10:1 to 1:1.
7. A composition according to any one of Claims 1-6, wherein the composition is a liquid composition, preferably a liquid aqueous composition.

8. An article of manufacture comprising a composition according to any of Claims 1-7, wherein preferably the article is selected from an aerosol, a spray dispenser, a refill, a cartridge, an iron, and a foam dispenser.
- 5 9. The article of manufacture of Claim 8 wherein said article is a spray dispenser selected from spray dispenser comprising battery operated pump, spray dispenser comprising a trigger spray device, spray dispenser comprising a pressurized aerosol spray dispenser, spray dispenser comprising a non-manually operated spray dispenser.
- 10 10. A method for treating the fabrics which comprises the steps of contacting the fabric with a water-soluble lubricant or composition according to any one of Claims 1-9, preferably subsequently cure the fabric.
- 11 11. A method according to Claim 10, wherein said method provides a reduction of the time and/or effort involved to iron fabrics.
- 15 12. A method according to either one of Claim 10 or 11, wherein said method increases the fabric WRA.
- 13 13. A method according to either one of Claim 10-12, wherein said method provides in-wear resistance to treated fabrics.
- 20 14. A method according to any one of Claims 9-13, wherein said method is performed in an in-home dewrinkling apparatus.
- 15 15. A method according to any one of Claims 9-13, wherein said method is performed with an iron.
- 25 16. An article of manufacture comprising a container and the composition of any one of Claims 1-7 in association with instructions to use an effective amount of said composition on fabric to provide at least one benefit selected from the group consisting of: reducing wrinkles; reducing the time and/or effort involved to iron fabrics, imparting in-wear resistance to fabrics.
- 30 17. Use of a composition as defined in any one of Claims 1-7, or cartridge as defined in Claim 8, in an iron for treating fabrics.



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## EUROPEAN SEARCH REPORT

Application Number  
EP 99 87 0223

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 376 802 A (MARSHALL ROBERT M) 15 March 1983 (1983-03-15) * claims *	1,3,4,7	D06M23/06
X	GB 827 647 A (TOOTAL BROADHURST LEE CO LTD) * page 1, line 14 - page 3, line 33; claims *	1,3,4,7	
X	GB 674 948 A (MONSANTO CHEMICAL CO) * page 2, line 37 - page 3, line 35; claims *	1,4,7,8	
A	US 5 100 566 A (LANE THOMAS H ET AL) 31 March 1992 (1992-03-31) * claims *	1,2,7,8	
A	US 4 661 268 A (JACOBSON JEFF A ET AL) 28 April 1987 (1987-04-28) * claims *	1,2,7,8	
A	US 5 573 695 A (TARGOSZ EUGENE F) 12 November 1996 (1996-11-12) * column 3, line 25 - column 8, line 22; claims *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7)  D06M
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>31 May 2000</b>	Examiner <b>Hellemans, W</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

31-05-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4376802 A	15-03-1983	NONE	
GB 827647 A		BE 552145 A BE 552146 A FR 1163125 A FR 1163126 A GB 855509 A	22-09-1958 22-09-1958
GB 674948 A		NONE	
US 5100566 A	31-03-1992	CA 2060141 A JP 4316671 A	05-08-1992 09-11-1992
US 4661268 A	28-04-1987	AU 6671086 A BR 8606406 A CA 1258754 A DK 621386 A EP 0228261 A JP 62170580 A NO 865282 A PH 23309 A	25-06-1987 13-10-1987 29-08-1989 25-06-1987 08-07-1987 27-07-1987 25-06-1987 30-06-1989
US 5573695 A	12-11-1996	CA 2187468 A,C	20-06-1997

EPO FORM P0458

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82